# SCHOOL EFFECTIVENESS AND LEARNER'S ACHIEVEMENT AT PRIMARY STAGE

*(A BASELINE BENEFICIARY STUDY IN 43 DPEP DISTRICTS)*

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**DEPARTMENT OF MEASUREMENT, EVALUATION, SURVEY & DATA PROCESSING**
National Council of Educational Research & Training
Sri Aurobindo Marg, New Delhi 110 016 (India)
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# FOREWORD

The District Primary Education Programme(DPEP) is a new initiative to achieve the Universalisation of Elementary Education(UEE) in India. In order to provide a scientific base to the formulation of strategies of implementation of the DPEP, six Baseline Beneficiary studies were conducted during 1993. The data of one of these studies, viz., Learning Achievement of Primary School Children in Reading and Mathematics, were re-analysed to identify factors relating to school policies and practices which can be considered for developing suitable intervention programmes for the improvement of pupil's performance in general, and reducing the achievement gap between boys and girls, and between SC/ST and non-SC/ST students in particular. This report attempts to fulfill this requirement for the DPEP districts of eight states, viz., Assam, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu.

The present study attempts to estimate contribution of the school level factors relating to teacher quality, school resources and school academic climate on pupil's achievement in mathematics and language at the terminal grade of primary stage. The approach adopted for the analysis is based on input-process-output model using two level Hierarchical Linear Modeling, a versatile statistical technique for partialling out the nested effect of student's background and school composition factors.

The use of this powerful technique has been made in the field of education for the first time in India. The NCERT faculty was trained in the applications of the technique by the Senior World Bank Consultant, Prof. J. D. Willms of the British Columbia University, Canada. He has also provided guidance at the different stages in the two Workshops conducted for the purpose. I thank him for his valuable contribution and for the academic support extended to the project team.

The study has been completed by Prof. R.R. Saxena and his team which has demonstrated dedication and team spirit for data analysis and drafting of the report. Prof. R. R. Saxena, Dr. Satvir Singh and Dr. J. K. Gupta have shouldered the responsibility of editing and bringing it out in the present form. The whole team deserves my appreciation.

I hope that the report will be helpful not only in designing the intervention programme in the DPEP districts but also provide a useful guide for the policy makers and educational administrators. In addition, the researchers will be encouraged to adopt the multi-level model in the studies for monitoring the school effectiveness.

Prof. A.K. Sharma
Director, NCERT

Dated August 17, 1995

## ACKNOWLEDGEMENT

The study was carried out under DPEP research programme. Support for the study was provided by the Government Of India, Ministry of Human Resource Development, Department of Education, District Primary Education Programme(DPEP), through the Policy and Human Resource Development Fund of the Government of Japan, as administered by the World Bank. Their support is gratefully acknowledged.

Under DPEP, as a part of project formulation process, six Baseline Beneficiary studies were conducted during 1993. The present study has used the data of one of these studies titled "Learning Achievement of Primary School Children in Reading and Mathematics". This study was conducted by the three national resource institutions. The National Council of Educational Research and Training conducted the study in five of the eight states, viz., Assam, Haryana, Madhya Pradesh, Maharashtra and Orissa. The National Institute of Educational Planning and Administration undertook the study in the states of Karnataka and Kerala, and the New Concept (a non-government organisation) in Tamil Nadu. Their contribution is also gratefully acknowledged.

Contribution of Prof. J.D. Willms, Senior Consultant, World Bank is gratefully acknowledged who introduced the topic of multi-level methods.

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## CHAPTER 1

## CONTEXT AND CONTENT OF THE STUDY

### Broad Perspective of the Study

Universalisation of Elementary Education(UEE) being the national priority, the National Policy on Education 1986 (NPE-86) emphasised that the new thrust in elementary education will focus on· (i) universal access and enrolment, (ii) universal retention of children up to 14 years of age; and (iii) a substantial improvement in the quality of education to enable all children to achieve essential levels of learning. In this respect, the NPE-86 inter-alia mentioned that a child-centered and activity-based process of learning approach should be adopted at the primary stage. Further, all primary schools should have the provision of essential schooling facilities in them.

The NPE-86 has specially emphasised on the removal of disparities and to equalise educational opportunity by attending to the specific needs of those who have been denied equality so far. The obstacles inhibiting their access to, and retention in elementary education will receive overriding priorities, through provision of special support services, setting of time targets and effective monitoring. For the educational development of girls, Scheduled Castes(SC), Scheduled Tribes(ST) and other disadvantaged groups, certain measures in the form of incentives, scholarships, appointment of teachers from the disadvantaged groups, etc., have been suggested.

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This chapter was written by Satvir Singh.

The NPE-86 resolved that

> " The New Education Policy will give the highest priority to solving the problem of children dropping out of school and will adopt an array of meticulously formulated strategies based on micro-planning, and applied at grass roots level all over the country, to ensure children's retention at school. This effort will be fully coordinated with the network of non-formal education. It shall be ensured that free and compulsory education of satisfactory quality is provided to all children upto 14 years of age before we enter the twenty-first century. A national mission will be launched for the achievement of this goal."

Based on the NPE-86 directives, the Programme of Action 1992(POA-92) while formulating the strategy for UEE envisaged adoption of disaggregated target setting and decentralised planning. It observed that within each state, even in the educationally backward ones, there are areas and districts which are almost within the reach of universalisation, while even in the educationally advanced states there are districts which are still quite backward. Therefore, it was considered necessary to prepare district-specific, population-specific plans for UEE within the broad strategy frame of micro-planning through people's participation and introduction of Minimum Levels of Learning(MLL) in schools to improve learner achievement. Micro-planning will provide the framework for universal access and universal participation while MLL would be the strategy frame of universal achievement. Under this broad strategy a number of strategies focussing on different dimensions of UEE have been proposed.

The POA-92 further suggested to develop district specific projects, with specific activities, clearly defined responsibilities, definite time schedule and specific targets.

Each district project will be prepared within the major strategy framework and will be tailored to the specific needs and possibilities in the district. Apart from effective UEE, the goals of each project will include the reduction of existing disparities in educational access, the provision of alternative system of comparable standards to the disadvantaged groups, a substantial improvement in the quality of schooling facilities, obtaining a genuine community involvement in the running of the schools, and building up local level capacity to ensure effective decentralisation of educational planning That is to say, the overall goal of the project would be reconstruction of primary education as a whole in selected districts instead of a piecemeal implementation of the scheme

As per the specified strategies in the POA-92, the government of India took several initiatives, including the District Primary Education Programme(DPEP) in 1993.

**The District Primary Education Programme**

The objective of the DPEP is to develop and implement in the selected districts, a replicable, sustainable and cost effective programme so as to·

(i) reduce differences in enrolment, dropout and learning achievement among gender and social groups to less than 5 per cent.

(ii) reduce overall dropout rates for all students to less than 10 per cent.

(iii) raise average primary achievement by 25 per cent over measured baseline levels.

(iv) provide according to national norms, access for all children to primary education classes (I to V) in primary schools, wherever possible, or its equivalent through non-formal education.

In order to achieve the above mentioned objectives, the DPEP focussed on development of district specific plan by keeping in view the following parameters:

(i) The emphasis on local area planning while formulating the district plans.

(ii) Greater rigour and infusion of professional inputs in planning and appraisal.

(iii) More focussed targeting - educationally backward districts with female literacy below national average and where Total Literacy Campaign has been successful.

(iv) The coverage will be focussed on primary stage with stress on girls and socially disadvantaged groups.

As an important part of the project formulation process six baseline beneficiary studies were undertaken by the national resource institutions. These studies were: (1) learning achievement of primary school children in reading and mathematics, (2) teacher policy, training needs and perceived professional status, (3) designing, production and distribution of instructional material, (4) educational problem of tribal children, (5) gender issues in primary education, and (6) state finances for education. The findings of these studies have provided some basis in designing and formulating the district plans.

In order to discuss the various aspects involved in this process it may be appropriate to briefly present the national scenario of primary education of the country.

## The Current Status of Primary Education

India, a union of states, is a parliamentary democracy with a federal structure. The country is comprised of 25 states and 7 Union Territories with diversities in cultures, languages, etc It is the second most populous country in the world with a population of 846.3 million in 1991.

The national system of school education is comprised of: (i) primary stage(grades I to V), (ii) upper primary stage( grades VI to VIII), (iii) secondary stage(grades IX & X), and (iv) higher secondary stage (grades XI & XII). An independent school may be a primary school or upper primary/secondary/higher secondary school having all/some/no lower stage(s) in them. In some of the states the terminal grade for primary/upper primary schools is grade IV/VII. The majority of primary schools are managed by the government/local body (local self government).

There has been a marked expansion in primary education during the post-Independence period (since 1947). The number of primary schools increased from 2,09,671 in 1950-51 to 5,65,786 in 1991-92. Enrolment at the primary stage have jumped almost five fold from 20 million to 120 million in 1991-92.

In spite of the substantial expansion of primary schooling facilities the schools, as revealed by the Fifth All India Educational Survey (NCERT, 1992), are not attractive enough to enroll the children and retain them. Approximately 14 per cent of primary schools (5,28,730) are without buildings (open space/ tents/ thatched huts) and another 14 per cent are running in 'kachcha' buildings. About 29 per cent schools are managed by single teacher. The pupil-teacher ratio is 45. Of the teachers,

teaching at the primary stage, about 14 per cent are untrained. There are 14 per cent teachers who studied only up to middle stage (grade VIII). The percentage of female teachers is 28. Only 55 per cent classes/ sections in primary schools have usable blackboards. About 30 per cent schools have library, only two per cent subscribe newspaper, and 19 per cent have textbook bank. Further, only 47 per cent schools have drinking water facility, 15 per cent urinals, and six per cent lavatory.

A number of efforts have been made, in the past, to study the achievement of children at primary stage. The first major study, on achievement in mathematics by Kulkarni(1970), found: boys achieved higher than girls; socio-economic conditions of the parents positively related with pupil's achievement; management of schools (e.g., government or private management) provided better teaching-learning situations; and no relation was found between school achievement and teacher qualifications. Dave (1988) found large differences in mathematics and language achievement between states. The study by Shukla (1994) revealed that over the states, the difference between the mean achievement of boys and girls did not have the same direction. In some states boys did better than girls whereas in some other states girls did better than boys. In all the states the SC/ST pupils performed lower than the non-SC/ST ones. Further, the pupil's achievement was found to be positively related with father's education, facility for learning and educational environment at home. The variables related to schools and teachers indicated somewhat weak relationship with achievement. Jangira (1994), while synthesizing

the results of the eight DPEP states, found that the students performed low in reading as well as in mathematics. There was a marked difference in achievement across schools as well as across states.

It can be summarised that the primary schools in the country are not adequately equipped to attract and retain the children. Also, the achievement level of students differed widely not only between schools but also over the states.

## Goals of the Present Study

For not only increasing the enrolment and retention but also to improve the achievement of children in schools, efforts are afoot to provide essential schooling facilities at the primary stage. Besides this, the curricular content, teacher training, comprehensive and continuous evaluation, monitoring and supervision, parent involvement, and community participation are given due importance. The DPEP takes holistic approach of school improvement by considering all these aspects. What could be the possible priorities helpful in formulation of policy interventions for the purpose is an important question to be answered. The present study is an effort in this direction.

The study is undertaken specifically to re-analyse the data of a baseline beneficiary study, viz., 'Learning Achievement of Primary School Children in Reading and Mathematics'. The focus is on studying the school policies and practices vis-a-vis learner's achievement at the primary stage. Thus, the specific goals are to study

(i) the effects of school policies and practices on learner's achievement;

(ii) the achievement differences between boys and girls in relation to school level variables;

(iii) the effects of school policies and practices on achievement gap between SC/ST and non-SC/ST; and

(iv) the impact of state interventions on learner's performance.

## Conceptual Framework of the Study

In this study, the effectiveness of school is measured in terms of pupils achievement in mathematics and language as outcome measures. The outcome measures are affected by several school level factors, like, infrastructural facilities, curricular content, quality of instructional material, teacher's competence, classroom teaching and learning activities, evaluation and feedback, teacher's attitude, supervision and monitoring, parents involvement, special interventions (Operation Blackboard and incentive schemes), etc. Further, the school intake also affect the outcome measures. The intake includes each pupil's background and also the characteristics of the composite group in the school. The important pupil's background factors are parent's education and their occupation, social background, prior learning achievement, home environment, family size, etc. There are some external factors, like, health of the child, overall economic development of the locality, means of communication, etc. which also affect the learner's achievement.

The above dimensions and their factors are not only very large in number but also complex in nature. Their identification and measurement in a comprehensive manner are impossible.

Further, choice for selection of factors is governed by several constraints because of their complex inter-dependence and inter-relationship Hence, important and relevant factors are considered to study their effect.

In this respect, the school level factors are clubbed into four major constructs, viz., teacher quality, school resources, school academic climate, and the state interventions. In addition to these, two constructs, namely, pupil's background and school context(school intake composition) are also considered. Each of these constructs and their factors are presented in figure 1.1 in the form of Input-Process-Output model. In this model schooling system is viewed in terms of different inputs provided, and various schooling processes involved leading to the pupil's learning outcomes. The model under input contains the components of pupils input, school intake composition, teacher quality, school resources, and intervention programmes. The process structure of the model contains components of school academic climate. The output is represented by the achievement scores in mathematics and language.

insert Figure 1 1 here about

The above model recognises the multi-level structure of the schooling system, and separates school processes from factors that lie outside the control of teachers and administrators. In this study, the hierarchical structure has only two levels, viz., pupil-level and school-level.

The necessary methodological details about the sampling design, construction of indicators, procedure followed in analysis of data, etc., are presented in the end, under Chapter 7 entitled "Methodology" for readers who are interested in more technical details about the study

**Instrumentations**

The data used in the study are collected by canvassing the following five tools. These tools were translated into regional language of the respective eight states.

(i) Test on mathematics (40 items) - for grade V students
or
Test on mathematics (40 items)- for grade IV students

(ii) Test on reading(84 items) - for grade V students
or
Test on reading(40 items) - for grade IV students

(iii) Student (Present) Schedule(SS)

(iv) School Record School(SRS)

(v) Teacher Schedule (TS)

Note· Different tests were administered on students of grade IV and V, the terminal grade of primary schools in different states as per their school pattern.

**States Involved**

The baseline beneficiary studies were conducted in the selected eight states. The study of 'learning achievement of primary school children in reading and mathematics' was conducted by different national resource institutions as mentioned below. The acronym given for the name of the state is used throughout this study.

| Acronym used | State | Resource Institution conducted the study |
|---|---|---|
| ASM | Assam | National Council of Educational Research and Training(NCERT) |
| HAR | Haryana | NCERT |
| KAR | Karnataka | National Institute of Educational Planning and Administration(NIEPA) |
| KER | Kerala | NIEPA |
| MP | Madhya Pradesh | NCERT |
| MAH | Maharashtra | NCERT |
| ORI | Orissa | NCERT |
| TN | Tamil Nadu | New Concept (a non-government organisation) |

**About the Content of this Book**

This report addresses a number of issues raised in the form of goals of the study as mentioned earlier. Each subsequent chapter independently addresses to only one objective in the same sequence in which objectives are listed.

Chapter 2 deals with the effects of factors belonging to three school level constructs, viz., teacher quality, school resources, and school academic climate on pupil's achievement after isolating the effects of pupil's background and school intake composition variables. The results for both the outcomes, i.e., mathematics and language achievement are presented and discussed concurrently for all the eight states together. Also, the results of all the eight states are further synthesised by applying meta analysis technique in order to study the

consistency and stability of the results. The conclusion of the chapter provides the indications useful for planning certain interventions to improve the quality of primary education.

Chapter 3 covers aspects related to achievement differences between boys and girls in mathematics and language How these differences vary from state to state is initially examined A detailed discussion about the school level variables which are reducing/increasing this gap is also presented. The results of all the eight states are further synthesised and presented to provide a consolidated picture.

Similar to the gender gap presented in Chapter 3, Chapter 4 presents the gap in achievement between SC/ST and non-SC/ST students in all the eight states. Subsequently, the factors which are possibly responsible in reducing/increasing this gap are discussed in detail.

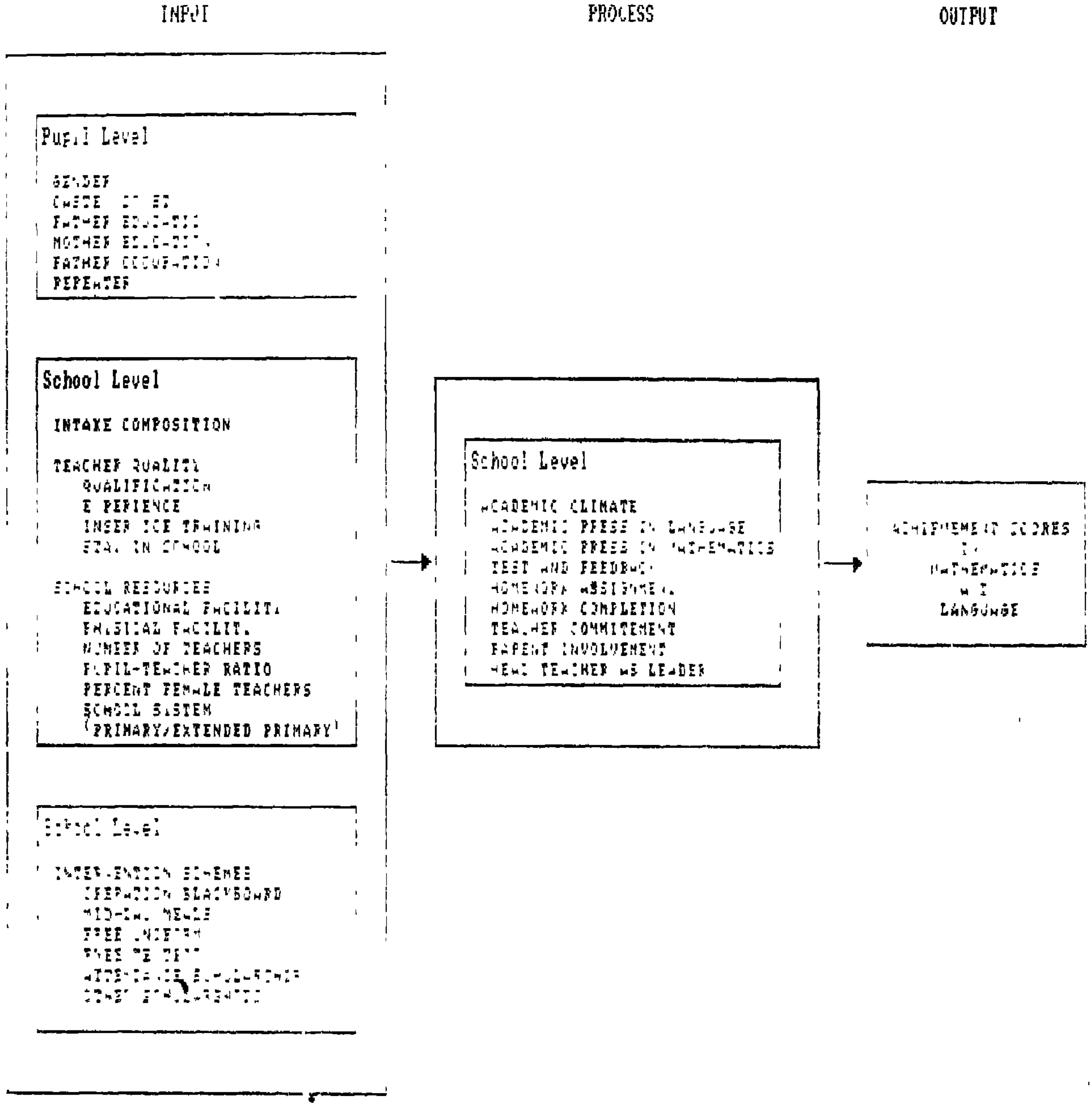
Chapter 5 covers the effects of state intervention programmes, like, Operation Blackboard(OB) Scheme, Mid-day meals, free textbooks, etc., on pupil's achievement in mathematics and language in all the eight states. These schemes have different purposes. For example, the OB scheme is to provide the essential physical and educational facilities in primary schools, whereas the free textbooks are for the disadvantaged group. Therefore, the effect of an intervention on achievement is discussed separately or in a group depending upon the purpose.

Chapter 6 provides the summary of the findings of the whole study in an integrated manner.

As mentioned earlier, the last Chapter 7 covers the methodology followed in planning and execution of the present study.

Figure 1.1

Input-Process-Output Model



## CHAPTER 2

## SCHOOL EFFECTS AND LEARNER'S ACHIEVEMENT

Achievement score as an outcome measure of student's performance depends on several factors. It depends not only on the policies and practices of school, but also on the background characteristics of the pupils entering the school, and on wider social and economic factors (school intake composition). The factors of student's background and school intake composition are important for their contribution. However, these factors are not directly manipulable by the educational administrators and school teachers as they lie outside the purview of the school system. The factors related to the school policies and practices can be suitably modified for improving the learner's achievement. For estimating the specific effects of school policies and practices, it is necessary to segregate the effects of the pupils background and school intake composition. The present chapter deliberates on all these aspects.

To begin with, the total variance is partitioned into two components, viz., within schools variance and between schools variance. The within school variance provides the extent of difference among students whereas the between school variance gives the difference among schools in their mean performance. How much of the within school variance is explainable by the pupil's background variables is taken up first for discussion. This is followed by the discussion about the estimates of effects of

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This chapter was written by Satvir Singh and R. R. Saxena.

each of the pupil background and the school intake composition variables. It may be mentioned that the effects of school level factors on achievement gap between boys and girls, and between SC/ST and non-SC/ST are studied extensively in the Chapters 3 and 4 respectively.

The differences in adjusted school means are subsequently studied by examining the contribution of factors of school policies and practices. For this purpose, the school level factors are grouped into three major constructs, namely, teacher quality, school resources and school academic climate. Contribution of the group of factors related to each construct is presented separately.

## Achievement Differences Among Students and Between Schools

The component of within school variance before adjustment, and the component of within school variance after adjustment for pupil's background variables for each state in respect of mathematics and language are presented graphically in Figures 2.1 and 2.2.

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Insert Figure 2.1 and Figure 2.2 here about

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Figure 2.1 shows that the components of within school variance (unadjusted) for both mathematics and language are large. These components vary substantially from state to state. In mathematics, Kerala has the largest size of the component (about 80%) whereas Karnataka has the smallest size (about 39%). In language (Figure 2.2), it is the highest for Kerala (about

86%) and the lowest for Karnataka and Madhya Pradesh (about 55%). Mostly the values are uniformly lower in mathematics than in language.

The position regarding the component of between school variance is complementary to the within school variance. There are large differences in achievement between schools for mathematics and language within each state. These variances also vary across states. Kerala indicates the lowest variances for both mathematics (about 20%) and language (about 14%). Whereas, the largest variance between schools for mathematics is in Karnataka (about 61%) and for language (about 45%) in Karnataka and Madhya Pradesh. However, these variations are uniformly lower in language as compared to mathematics.

The component of within school variance is reduced substantially after adjusting for pupil's background variables (Figures 2.1 & 2.2). For mathematics, the reduction is ranging from about 5% in Orissa to 30% in Maharashtra. Whereas, in language it varies from 7% in Orissa to 27% in Karnataka. This shows that the pupil's background contributes substantially, say, up to 30 per cent of the component of within school variance. This indicates that for improving the student's performance one important aspect is to reduce the differences in their background by organising relevant interventions, like, adult literacy, awareness about women equality, and other welfare programmes at the community level.

The estimated contribution of each pupil-level variable is discussed in detail along with the contribution of school intake

composition in the next section.

## Contribution of Pupil's Background and School Context Variables

The contribution of pupil's background and school context variables to mathematics and language achievement is given in Tables 2.1 and 2.2 respectively.

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Insert Table 2.1 and Table 2.2 here about

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The results show that, on average, girls are performing poorer than boys in mathematics in the states of Assam, Haryana, Karnataka, Madhya Pradesh and Orissa. In language also, girls are performing poorer than boys for all the states except for Haryana and Kerala. It is interesting to note that Kerala is the only state where boys and girls do not differ in mathematics and language achievement. The gender achievement gap varies substantially from one school to another school. This indicates that in some schools the gap is small whereas in some other schools it is large.

The SC/ST students, on average, score lower in mathematics than non-SC/ST students in Haryana, Karnataka, Kerala, Madhya Pradesh and Maharashtra. In language achievement, the gap is quite discernible in Haryana, Kerala and Madhya Pradesh. It is of interest to note that three states, viz., Assam, Orissa and Tamil Nadu indicate no such gap in both mathematics and language achievement. However, in most states these gaps do not vary among schools, whereas Karnataka and Kerala are the two exceptions in language achievement only.

Father's education within schools has shown a positive

association with pupil's achievement in both mathematics and language in all the states except in Karnataka, Maharashtra and Tamil Nadu for Mathematics, and except in Haryana for language.

Mother's education has displayed a strong and positive association with achievement in all the states except in Tamil Nadu for mathematics, and except in Karnataka and Tamil Nadu for language.

A similar behavior within schools is observed for father's occupation associated with achievement with the exception of Tamil Nadu for mathematics, and Assam and Maharashtra for language.

The achievement differences between pupils who have repeated one or more grades, and those who have not, are large. The repeaters perform lower than non-repeaters. The size of this difference does not vary substantially among schools within each state. However, the differences are consistent across states.

At the school level the mean-SES is positively associated with the school mean achievement in mathematics and language after adjusting for pupil's background. This association is strong for mathematics in the states of Kerala, Madhya Pradesh, Maharashtra and Orissa, and for language in Karnataka, Kerala, Madhya Pradesh and Maharashtra. It indicates that as the school intake composition in terms of mean-SES changes the corresponding school mean achievement also changes. In other words, higher the mean-SES of the school intake composition higher would be the school mean achievement. It is quite likely that if a student of low SES is admitted to a school with high SES of intake

composition, her/his performance would improve in comparison of a school with low SES intake composition. Perhaps, the concept of neighborhood school would be the most appropriate to improve the performance of low SES students.

The association of per cent SC/ST in school with school mean achievement is not consistent across states. In Kerala the association is positive and discernible for both the subjects whereas in Haryana for mathematics and in Karnataka for language the association is negative. The negative association indicates that larger the percentage of SC/ST students in a school poorer is the school mean achievement. Perhaps, SC/ST as a group are more socially disadvantaged in Haryana and Karnataka as compared to Kerala. Kerala is the most educationally advanced state in the country.

It may be noted that Kerala has the lowest unadjusted between school variance in mathematics and language achievement. This value is reduced further after adjusting for pupil's background and contextual effects In order to depict as to how close are the school means to their grand mean, language achievement for Kerala is displayed graphically in Figure 2 3. Contrary to this, the schools of Karnataka which has the largest between school variance in mathematics are presented in Figure 2.4. It may be observed that these two figures differ from each other. The former shows schools closer to their grand mean reflecting more or less equal standard of schools in Kerala. Whereas, the latter displays large differences among school means indicating a wider range of school quality.

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**Insert Figure 2.3 and Figure 2.4 here about**

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**Effects of School Level Variables**

The variation between schools, after adjusting for pupil's background and contextual variables, is taken to find out the specific contribution of the school level factors. As mentioned earlier, all the school level factors are grouped into three constructs, namely, teacher quality, school resources and school academic climate. Each construct, consisting of a block of factors, is considered independently for estimating the contribution in the school mean achievement. The between school variance adjusted for school context formed the basis for further analysis. The between school variances further adjusted for teacher quality, for school resources, and for school academic climate are studied. These variances are presented graphically in Figure 2.5 and 2.6 for mathematics and language achievement respectively. It may be noted that the maximum variance is explained by the construct of school academic climate followed by the construct of teacher quality and by the school resources.

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Insert Figure 2.5 and Figure 2.6 here about

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The estimates of effects of separate sets of factors related to teacher quality, school resources and academic climate are reported in Tables 2.3, 2.4, and 2.5 respectively. The synthesis of the results of eight states for all the three sets together is presented in Table 2.6.

### (i) Factors of Teacher Quality

The four factors of teacher quality included in the analysis are: teacher qualification, teaching experience, inservice training attended, and period of stay of a teacher in the present school.

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Insert Table 2.3 here about
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The results (Table 2 3) show a discernible association of teacher qualifications (school average) with the school mean achievement in Assam and Kerala (mathematics and language), in Maharashtra (mathematics), in Madhya Pradesh and Tamil Nadu (language). The association is positive in Assam and Tamil Nadu whereas it is negative in Kerala, Madhya Pradesh, and Maharashtra. On further exploration, it is found that in the states of Assam and Tamil Nadu majority of schools (more than 85%) are independent primary schools whereas in other states the substantial number of primary schools are attached with upper primary/secondary/higher secondary schools. The aggregated qualification (average) for all teachers at school level is comparatively low in Assam and Tamil Nadu than in other states. Perhaps, this may be a reason as to why the teacher qualification is positively associated with school mean achievement in Assam and Tamil Nadu and negatively associated in other states.

The contribution of the teacher qualification to the achievement across states is not substantial in both the

subjects. However, the size of contribution is varying across states (refer Table 2.6).

The teaching experience (school average) is negatively associated with mathematics and language achievement only in Kerala. This indicates that longer the average years of teaching experience poorer is the school mean achievement. This aspect is further examined graphically through Figure 2.7. It shows that the school mean achievement increases as the years of teaching experience increases. This increase continues up to 10 years of experience and starts decreasing thereafter. The results of meta analysis in Table 2.6 based on three states also indicate a consistent and negative association in both the subjects.

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Insert Figure 2.7 here about

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The factor of average number of teachers in a school who attended inservice training is negatively associated with achievement in mathematics for Karnataka and with language achievement for Assam. In Karnataka, about 60 per cent teachers who attended the inservice training programme belongs to those schools which have higher grades and may not be teaching the target group. Whereas, in Assam only 33 per cent teachers of the primary schools attended the inservice training. Further, a large percentage of teachers (about 28%) is below secondary. Both these reasons may be responsible for the negative association.

The factor of average duration of stay of a teacher in the present school is positively associated for mathematics in the

state of Madhya Pradesh and for language in Tamil Nadu. The contribution of the variable across states is quite stable. The pooled association of this variable with the language achievement is strong and positive. An increase of one year stay in the school, on average, tends to increase language school mean achievement by 2 per cent of a standard deviation.

**(ii) Factors of School Resources**

Out of seven factors of school resources, only four factors have indicated an association with school mean achievement both in mathematics and language (Table 2.4). These factors are educational facility, physical facility, number of teachers in the school, and pupil-teacher ratio. However, their relationships are at variance among states. Educational facility is positively associated with mathematics achievement in the states of Kerala and Madhya Pradesh. In language, the association is positive in Madhya Pradesh and negative in Maharashtra. The negative association in Maharashtra may be due to the inflated figures of educational facility which is aggregated at school level. In Maharashtra more than 30 per cent schools are attached primary schools, i e., schools having higher grades together with primary grades.

The association of physical facility with the achievement in both the subjects is strong and positive in Karnataka, Madhya Pradesh and Orissa. On synthesizing the results it is found that educational and physical facility in schools have quite stable and strong positive association with the mean achievement in mathematics (Table 2 6). If educational facility is increased by

one unit, on average, the school mean achievement in mathematics would increase by about 3 per cent of a standard deviation. Whereas, the increase would be about 4.5 per cent of a standard deviation if the physical facilities in the school are increased by one unit.

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Insert Table 2.4 here about

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Number of teachers in a school tends to have negative association with the achievement in both the subjects for the state of Karnataka whereas it is positively associated only in language for Tamil Nadu. It may be noted that the negative association in Karnataka may be because of inclusion of those teachers teaching at the higher grades. It is substantiated by the fact that in Karnataka, the sample includes about 43 per cent schools having primary as well as higher grades. Whereas in Tamil Nadu such schools are just 14 per cent.

The pupil-teacher ratio have displayed negative association with the school mean achievement in mathematics and language in the state of Madhya Pradesh. This indicates that as the number of pupils per teacher increases the achievement decreases. This aspect is further explored. Figure 2.8 represents the schools of Madhya Pradesh with their mean achievement in mathematics (adjusted for pupil's background and school context) in relation to pupil-teacher ratio. The graph shows that the mean achievement score tends to decrease as the pupil-teacher ratio increases. It coincides with the state mean when pupil-teacher ratio reaches at

**50 (mean value) and starts declining thereafter.**

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Insert Figure 2.8 here about

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The meta analysis (Table 2.6) has not provided the stable association of number of teachers and pupil-teacher ratio with achievement.

### (iii) Factors of School Academic Climate

All the seven factors of the school academic climate (Table 2.5) have displayed strong association with school mean achievement in one state or another, except for head teacher leadership in mathematics. The contribution of each factor is not uniform across states.

The factor of teacher gives arithmetic problems to solve in the class regularly (Math problem) has strong and positive association with mathematics achievement in the states of Assam, Haryana, Kerala and Madhya Pradesh.

The teacher asking to read aloud and take dictation is positively associated with language achievement in Karnataka and Tamil Nadu whereas it is negatively associated in Madhya Pradesh. In Madhya Pradesh medium of instruction at primary stage specially in tribal areas is different from the mother tongue of the child. Perhaps, this may be the reason for the negative association

Teacher frequently testing and providing feedback (Test feedback) has displayed strong and positive association in both the subjects for Kerala and Madhya Pradesh whereas such evidence

is available for the state of Karnataka only in mathematics. For Karnataka Figure 2.9 shows that as the frequency of teacher taking test and providing feedback increases the school mean achievement increases. This finding also support the policy of introduction of comprehensive and continuous evaluation in the school system.

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Insert Figure 2.9 here about

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Teacher frequently assigning and correcting homework has provided strong and positive association with mathematics achievement in Maharashtra, Orissa and Tamil Nadu. Its association with language achievement is also distinct and positive in Assam, Madhya Pradesh, Maharashtra and Orissa. An example of language achievement for the state of Maharashtra is shown graphically in Figure 2.10. This indicates that the higher is the frequency of teacher assigning the homework and its checking substantially help in improving the school mean achievement

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Insert Figure 2.10 here about

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The time devoted for doing homework by pupils (pupil do homework) is positively associated with achievement in mathematics for Kerala and in language for Assam and Haryana. This aspect is further displayed graphically in Figure 2.11 in mathematics for the state of Kerala.

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Insert Figure 2 11 here about

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The teacher commitment is positively associated with mathematics performance in Maharashtra and with language performance in Haryana, Madhya Pradesh and Maharashtra. This association, however, is negative in Assam with both the subjects. Perhaps, substantial number of less qualified teachers (28 per cent below secondary) is the main cause for this negative association.

Parent involvement is positively associated with mathematics achievement in Karnataka and with language achievement in Kerala.

Head teacher as leader indicates positive association only with language achievement in the state of Assam.

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Insert Table 2.6 here about

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The synthesis of the results (Table 2.6) shows that the two factors, viz., teacher frequently testing and providing feedback, and teacher frequently assigning and correcting home work , are positively associated with the mathematics and language school mean achievement. The contribution of the former factor is 21 per cent and 18 per cent of their respective standard deviation to the mathematics and language achievement respectively. Whereas, the corresponding contribution of the latter factor is 30 per cent and 25 per cent of their respective standard deviation.

The time devoted (on average) for doing the home work by pupils has indicated a positive and significant contribution in language achievement Increase by 1 unit of the activity by an

average student would result into an increase in school mean achievement by about 10 per cent of a standard deviation.

Another important factor, teacher regularly gives arithmetic problems to solve in the class, indicates strong and positive association with the mathematics school mean achievement. A unit increase in the frequency of this activity would enhance school mean achievement by 32 per cent of a standard deviation.

**Conclusion**

In this chapter a number of factors that are possibly related to the learner's achievement are analysed. It is important to stress the fact that focus has been on identifying the factors of school policies and practices that affect the pupil's performance in mathematics and language at primary stage (grade IV/V) in the states of Assam, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu. This has been systematically attempted by first estimating the effects of pupil's background and school context factors and then isolating them to obtain the specific contribution of the three sets of school level factors belonging to teacher quality, school resources, and school academic climate.

Some of the results are quite interesting and stable across states for both mathematics and language achievement In some cases the results are at variance across states. Such results are quite likely simply because these eight states differ substantially with respect to their socio-economic, cultural and educational background. Also, some of the factors are based on the whole school than the part of it which is relevant for the

target group This is true in case of teacher quality factors

The achievement in mathematics and language among students vary substantially across states. Among eight states, Kerala has the highest variation among student achievement(more than 80%). The between school variance is the lowest in Kerala, being complementary to within school variance. The between school variances are mostly lower in language than in mathematics across states.

The differences between boys and girls in their achievement are found to be large. On average, girls performed lower than boys in all the states except in Kerala. However, these differences vary across schools. This indicates that even in some schools girls perform better than boys. Further, the variation in these differences is uniformly lower in language than that in mathematics. SC/ST students perform lower than non-SC/ST students in their achievement in all states other than Assam, Orissa and Tamil Nadu. However, in most states these differences did not vary among schools except for Karnataka and Kerala only in language. Parents' education (both Mother and father) and father's occupation have shown positive association with pupil's achievement and are mostly consistent across states. Pupils, who have repeated one or more grades have performed lower than those who have not repeated. The differences, though consistent across states, do not vary significantly among schools.

The Mean-SES, as a school context variable, has displayed positive association with school mean achievement. The variable, per cent SC/ST is found negatively associated with school mean

achievement.

The factors of school academic climate construct have indicated stronger association with the achievement than that of teacher quality and school resources.

Out of the four factors of teacher quality, it is found that the association of teacher qualification with the school mean achievement is not consistent across states. It is positive in two of the states (Assam and Tamil Nadu) and negative in the other two states (Kerala and Madhya Pradesh). On synthesis, the contribution of the teacher qualifications to the school mean achievement is found varying across states. Teaching experience is found to be negatively associated with mathematics and language school mean achievements. The proportion of school teachers having undergone inservice training is also found to be negatively associated with the school mean achievement for mathematics (in Karnataka) and language (in Kerala). The factor related to average duration of stay of school teacher in the present school has indicated a positive association with the school mean achievement. The pooled association is also found positive with the school mean achievement in language.

Out of the factors under school resources, two factors, viz., educational facilities and physical facilities in schools are found to have positive association with school mean achievement in mathematics. These associations are mostly consistent across states. The other two factors, namely, the number of teachers in the school and pupil-teacher ratio are found to be negatively associated with the school mean achievement.

Under school academic climate, three factors, viz., teacher frequently taking test and providing feedback, teacher assigning and correcting homework, and time devoted by pupil for doing the homework have strong and positive association with the school mean achievement in mathematics and language. The fourth factor, namely, teacher frequently gives arithmetic problems to solve in the class, is found contributing to the mathematics school mean. The remaining factors, viz., teacher commitment, parent involvement and head teacher as leader have shown positive association with school mean achievement in some of the states.

## Table 2.1
## Effects of Pupil's Background and Context Variables on Achievement in Mathematics

| Variable | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) |
| Schl Mean | -.085 | -.015 | -.044 | .012 | -.067** | -.019 | -.115* | -.053 |
| | (.059) | (.048) | (.060) | (.042) | (.027) | (.060) | (.057) | (.056) |
| Mean SES | .139 | .110 | .049 | .288* | .178** | .380** | .248* | .180 |
| | (.122) | (.104) | (.118) | (.119) | (.055) | (.115) | ( 108) | (.139) |
| Pct SCST | -.001 | -.004* | -.003 | .014** | .000 | .002 | - 001 | -.001 |
| | (.002) | (.002) | (.003) | (.003) | (.001) | (.002) | (.002) | (.002) |
| Gendr gap | -.130** | -.232** | -.108* | -.063 | -.178** | -.058 | -.150** | -.043 |
| | (.048) | (.052) | (.044) | (.045) | (.025) | (.063) | (.054) | (.049) |
| SCST gap | -.047 | -.093* | -.085** | -.272** | -.060** | -.082* | -.066 | -.016 |
| | (.069) | (.045) | (.033) | (.055) | (.023) | (.041) | (.056) | (.048) |
| Father Edn | .081** | .045* | .019 | .043* | 045** | .008 | .071** | .027 |
| | (.020) | (.019) | (.015) | (.018) | (.010) | (.019) | (.026) | (.019) |
| Mother Edn | .083** | .038* | .060** | .063** | .034** | .052** | .080** | .033 |
| | (.022) | (.019) | (.015) | (.018) | (.010) | (.019) | (.027) | (.019) |
| Father Ocu | .034* | .035* | .041** | .111** | .035** | .052** | .050* | .030 |
| | (.016) | (.018) | (.014) | (.017) | ( 009) | (.019) | (.025) | (.018) |
| Repeater | -.161** | -.240** | -.038 | -.339** | -.123** | -.099** | -.175** | -.076* |
| | (.039) | (.037) | (.033) | (.039) | (.020) | (.038) | (.049) | (.039) |
| Residual Variances | | | | | | | | |
| Schl Means | .466** | .272** | .583** | .169** | .431** | .416** | 396** | .333* |
| Gender gap | .121** | .112** | .151** | .119** | .071** | .278** | .076* | .129* |
| SCST gap | -- | -- | -- | -- | -- | -- | -- | -- |
| Ppl Scores | .457 | .642 | .354 | .722 | .517 | .533 | .544 | .609 |

* P<.05 ** P<.01

## Table 2.2
## Effect of Pupils Background and Context Variables on Achievement in Language

| Variable | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) |
| Schl Mean | -.063 | .004 | -.044 | .014 | -.065* | -.029 | -.089 | -.023 |
| | (.051) | (.052) | (.053) | (.034) | (.027) | (.056) | (.049) | (.056) |
| Mean SES | .072 | .135 | .234* | .249** | .222** | .300** | .163 | -.045 |
| | (.104) | (.109) | (.102) | (.097) | (.055) | (.109) | (.095) | (.138) |
| Pct SCST | -.003 | .000 | -.005* | .016** | .001 | .001 | -.001 | - 002 |
| | (.002) | (.002) | (.002) | (.002) | (.001) | ( 002) | (.002) | (.002) |
| Gnder gap | -.128** | -.070 | -.105* | .008 | -.197** | -.156** | -.156** | -.117* |
| | (.052) | (.048) | (.048) | (.039) | (.025) | (.060) | (.059) | (.051) |
| SCST gap | .054 | .113** | -.040 | -.406** | -.074** | .013 | -.062 | -.076 |
| | (.078) | (.044) | (.050) | (.073) | (.022) | (.042) | (.062) | (.049) |
| Father Edn | .065** | .029 | .048** | .071** | .058** | 059** | .074** | .071** |
| | (.023) | (.019) | (.018) | (.018) | (.010) | (.019) | (.029) | (.019) |
| Mother Edn | .074** | .062** | .033 | .097** | .040** | .073** | .129** | .013 |
| | (.023) | (.019) | (.017) | (.018) | (.010) | (.019) | ( 029) | (.019) |
| Father Ocu | .034 | .038* | .032* | .124** | .032** | 027 | .066** | .063** |
| | (.018) | (.018) | (.016) | (.017) | (.009) | (.019) | (.027) | (.018) |
| Repeater | -.209** | .216** | -.090* | -.428** | -.147** | -.156** | -.301** | -.198** |
| | (.043) | (.036) | (.038) | (.040) | (.020) | (.039) | (.053) | (.040) |
| **Residual Variances** | | | | | | | | |
| Schl Means | .315** | .334** | .438** | .103** | .434** | .359** | .241** | .334** |
| Gender gap | .138** | .085** | .157** | .060** | 088** | .242** | .095* | .148** |
| SCST gap | -- | -- | .106** | .141** | -- | -- | -- | -- |
| Ppl Scores | .586 | .610 | .491 | .737 | .510 | .549 | .646 | .615 |

* P < .05    ** P < .01

## Table 2.3
## Effects of School Level Variables - Teacher Quality

| Variables | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) |
| M A T H E M A T I C S | | | | | | | | |
| Tch Qual | .124** | .074 | | -.157** | | -.110* | | .056 |
| | (.048) | (.053) | | (.061) | | (.047) | | (.047) |
| Tch Exp | | | | -.023* | -.006 | | | -.014 |
| | | | | (.010) | (.004) | | | (.009) |
| Inservic | | .245 | -.343* | | .124 | | | -.008 |
| | | (.134) | (.153) | | (.071) | | | (.006) |
| Stay Prd | | -.026 | .021 | | .015* | | .029 | .021 |
| | | (.016) | (.015) | | (.006) | | (.018) | (.011) |
| L A N G U A G E | | | | | | | | |
| Tch Qual | .083* | | | -.116* | -.039* | -.068 | .068 | .097* |
| | (.042) | | | (.050) | (.018) | (.045) | (.037) | (.049) |
| Tch Exp | | | | -.021** | -.008 | | | -.016 |
| | | | | (.008) | (.004) | | | (.009) |
| Inservic | -.315* | .256 | -.208 | | .098 | | | |
| | (.153) | (.141) | (.135) | | (.072) | | | |
| Stay Prd | | | | .011 | .010 | | .027 | .024* |
| | | | | (.007) | (.006) | | (.016) | (.011) |

Note: the coefficients with P<.20 are reported.
*  P < .05   ** P < .01

### Table 2.4
### Effects of School Level Variables -School Resources

| Variables | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) |
| MATHEMATICS | | | | | | | | |
| Material | | | | | | | | |
| Ednl Facil | .027<br>(.019) | | | .031*<br>(.013) | .025*<br>(.012) | | | |
| Phy Facil | | | .092**<br>(.024) | | .029**<br>(.011) | | .059**<br>(.022) | |
| No Tchr | | | -.056*<br>(.027) | -.013<br>(.007) | | | | |
| P-T Ratio | | | | -.037<br>(.023) | -.022**<br>(.001) | -.006<br>(.004) | .007<br>(.004) | |
| Primary | | | | | | | -.171<br>(.136) | |
| Pct FmTch | | | | | | | | |
| LANGUAGE | | | | | | | | |
| Material | | | | | | | | |
| Ednl Facil | | | | | .014*<br>(.007) | -.036*<br>(.016) | -.029<br>(.016) | |
| Phy Facil | -.026<br>(.027) | | .065**<br>(.022) | | .028**<br>(.011) | | .060**<br>(.021) | |
| No Tchr | | | -.051*<br>(.025) | -.010<br>(.006) | | | | .049*<br>(.025) |
| P-T Ratio | | | | -.021<br>(.020) | -.004**<br>(.001) | | | .003<br>(.002) |
| Primary | | | | | | | | .003<br>(.002) |
| Pct FmTch | | | | .003<br>(.002) | | | | |

Note: the coefficients with $P<.20$ are reported.
* $P<.05$ ** $P<01$

## Table 2.5
## Effects of School Level Variables -School Academic Climate

| Variables | ASM<br>Coef.<br>(SE) | HAR<br>Coef.<br>(SE) | KAR<br>Coef.<br>(SE) | KER<br>Coef.<br>(SE) | MP<br>Coef.<br>(SE) | MAH<br>Coef.<br>(SE) | ORI<br>Coef.<br>(SE) | TN<br>Coef<br>(SE) |
|---|---|---|---|---|---|---|---|---|
| M A T H E M A T I C S | | | | | | | | |
| Math problm | .729**<br>(.197) | .350**<br>(.139) | | .373**<br>(.150) | .197**<br>(.064) | | | .189<br>(.164 |
| Test fdback | | | .327**<br>(.087) | .161*<br>(.072) | .196**<br>(.040) | | | |
| Tch give HW | .362<br>(.194) | | | | | .465*<br>(.200) | .429**<br>(.146) | .162<br>(.069 |
| Ppl do HW | .069<br>(.048) | | | .262**<br>(.089) | | | | |
| Tch commit | -.345**<br>(.109) | | | | | .279*<br>(.127) | | |
| Prnt invl | | -.111<br>(.062) | .117*<br>(.061) | | | | | |
| Ht leader | | | | | | -.133<br>(.091) | .150<br>(.100) | |
| L A N G U A G E | | | | | | | | |
| Read dictn | | | .367**<br>(.127) | | -.245**<br>(.091) | | | .496<br>(.237 |
| Test fdback | | | | .165*<br>(.070) | .189**<br>(.042) | | | |
| Tch give HW | .421*<br>(.174) | | | | .194*<br>(.084) | .433*<br>(.186) | .416**<br>(.129) | -.226<br>(.185 |
| Ppl do HW | .079*<br>(.041) | .121**<br>(.047) | | | | | | |
| Tch commit | -.203*<br>(.088) | .203**<br>(.075) | | -.121<br>(.079) | .105*<br>(.052) | .295**<br>(.119) | | |
| Prnt invl | | | .103<br>(.054) | .168*<br>(.077) | -.031<br>(.026) | | | |
| Ht leader | .279**<br>(.108) | | | | | -.134<br>(.086) | | |

Note: the coefficients with $P<.20$ are reported.
* $P<.05$ ** $P< 01$

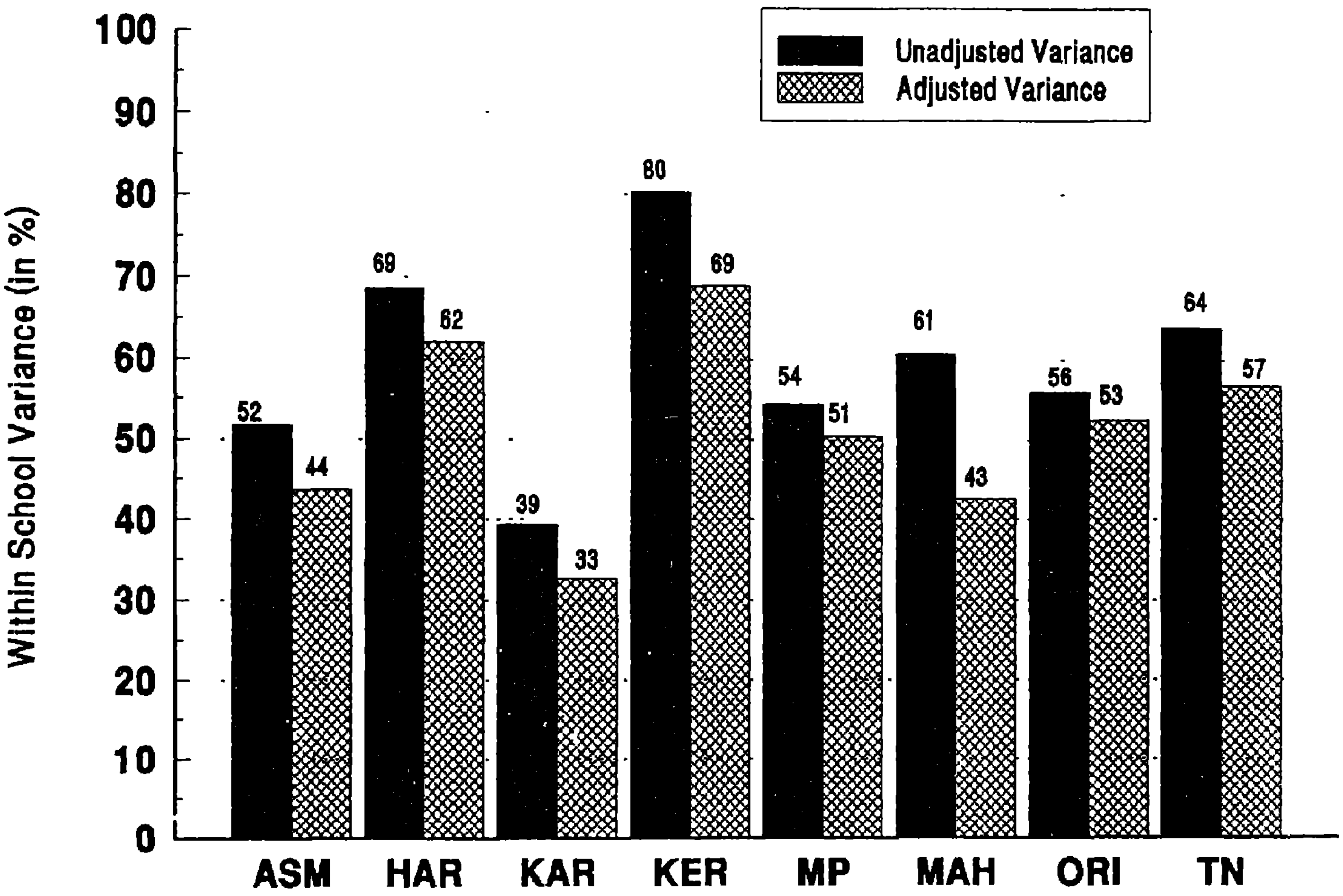
## Table 2.6
## Result of Meta Analysis of School Level Variables

| Variable | Mathematics | | Language | | Residual Variance | |
|---|---|---|---|---|---|---|
| | Coef. | (SE) | Coef. | (SE) | Math | Lang |
| Teacher Quality | | | | | | |
| Tch Qual | -.000 | (.054) | .002 | (.036) | .01211** | .00622** |
| Tch Exp | -.011* | (.005) | -.010* | (.003) | .00003 | .00000 |
| Inservice | .019 | (.103) | -.031 | (.126) | .03282** | .04795** |
| Stay Period | .013 | (.007) | .016* | (.006) | .00008 | .00002 |
| School Resources | | | | | | |
| Material | -- | -- | -- | -- | -- | -- |
| Ednl Facil | .028** | (.008) | -.014 | (.017) | .00000 | 00071** |
| Phy Facil | .045* | (.015) | .007 | (.026) | .00021 | .00103* |
| No Tchr | -.027 | (.020) | -.005 | (.026) | .00054* | .00169** |
| P-T Ratio | -.010 | (.008) | -.001 | (.003) | .00021** | .00002** |
| Primary @ | -.171 | (.136) | -- | -- | -- | -- |
| Pct FmTch @ | -- | -- | .003 | (.002) | -- | -- |
| School Academic Climate | | | | | | |
| Math problm | .321** | (.080) | -- | -- | .01400 | -- |
| Read & dictn | -- | -- | .177 | (.235) | -- | .14181** |
| Test & fdback | 207** | (.033) | .184** | (.036) | .00009 | .00002 |
| Tch give HW | .303** | (.090) | .253* | (.111) | .01330 | .03942* |
| Ppl do HW | .151 | (.095) | .097** | (.031) | .01351* | .00003 |
| Tch commit | -.036 | (.312) | .048 | (.093) | .18069** | .03595** |
| Prnt invl | -.001 | (.112) | .065 | (.061) | .02131** | .00844** |
| Ht leader | .005 | (.141) | .067 | (.206) | .03090* | .07575** |

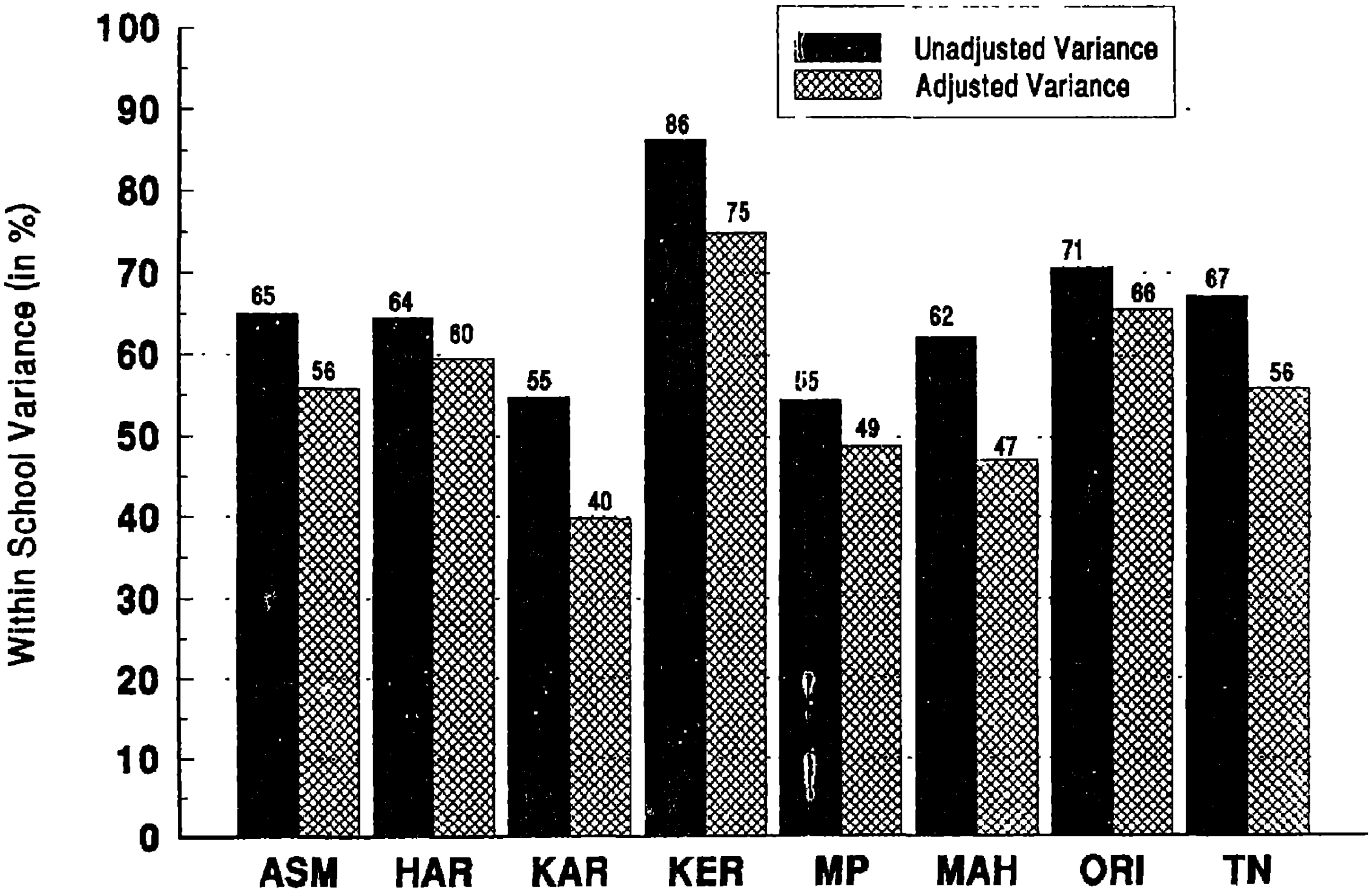
* P<.05 ** P< 01
@ Result of one state

**Figure 2.1**

**Within School Variance Before and After Adjusting for Pupil's Background (Mathematics)**



## Figure 2.2
## Within School Variance Before and After Adjusting for Pupil's Background (Language)



## Figure 2.3

## Adjusted School Language Mean Versus Mean-SES for Kerala

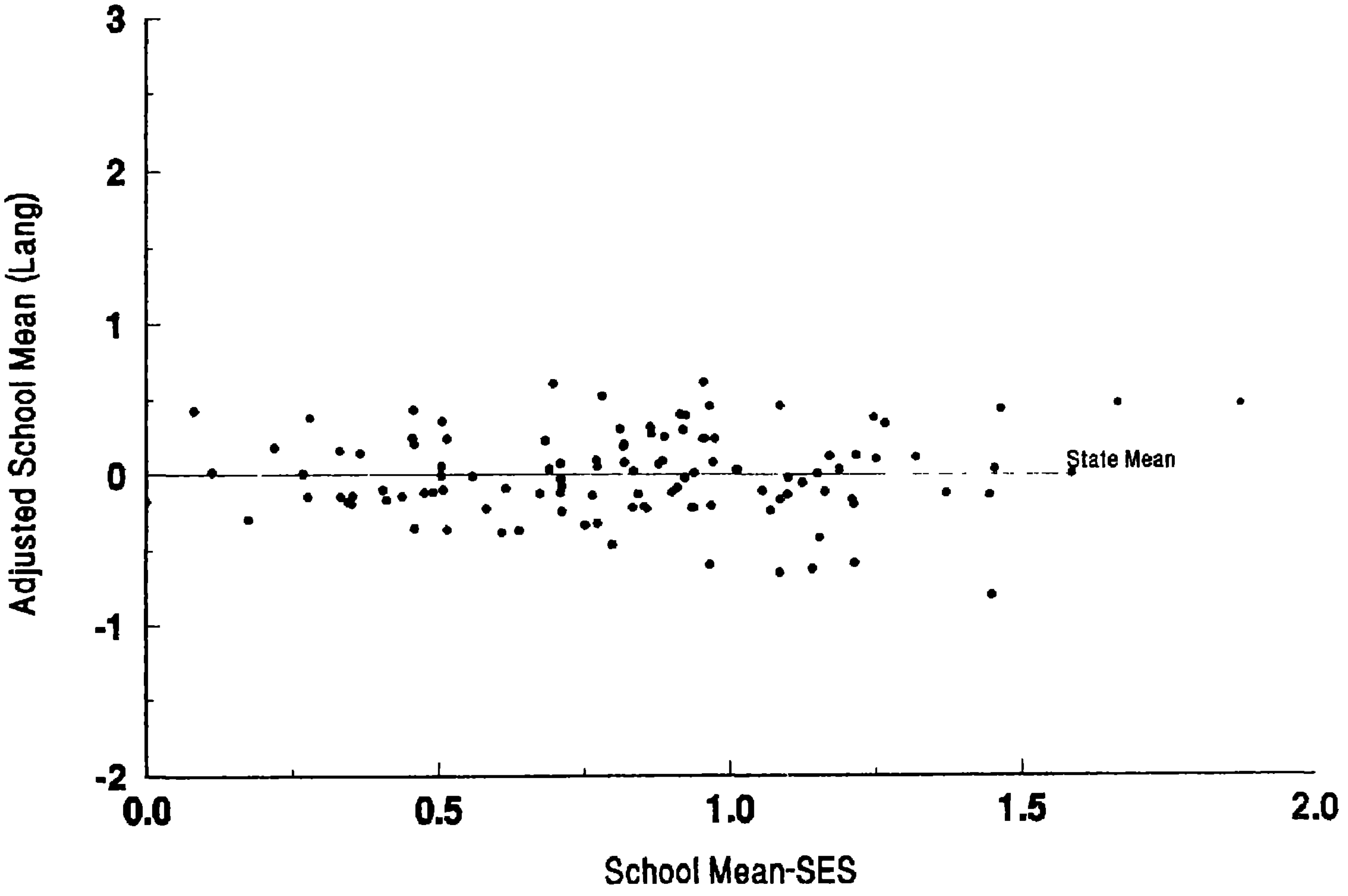
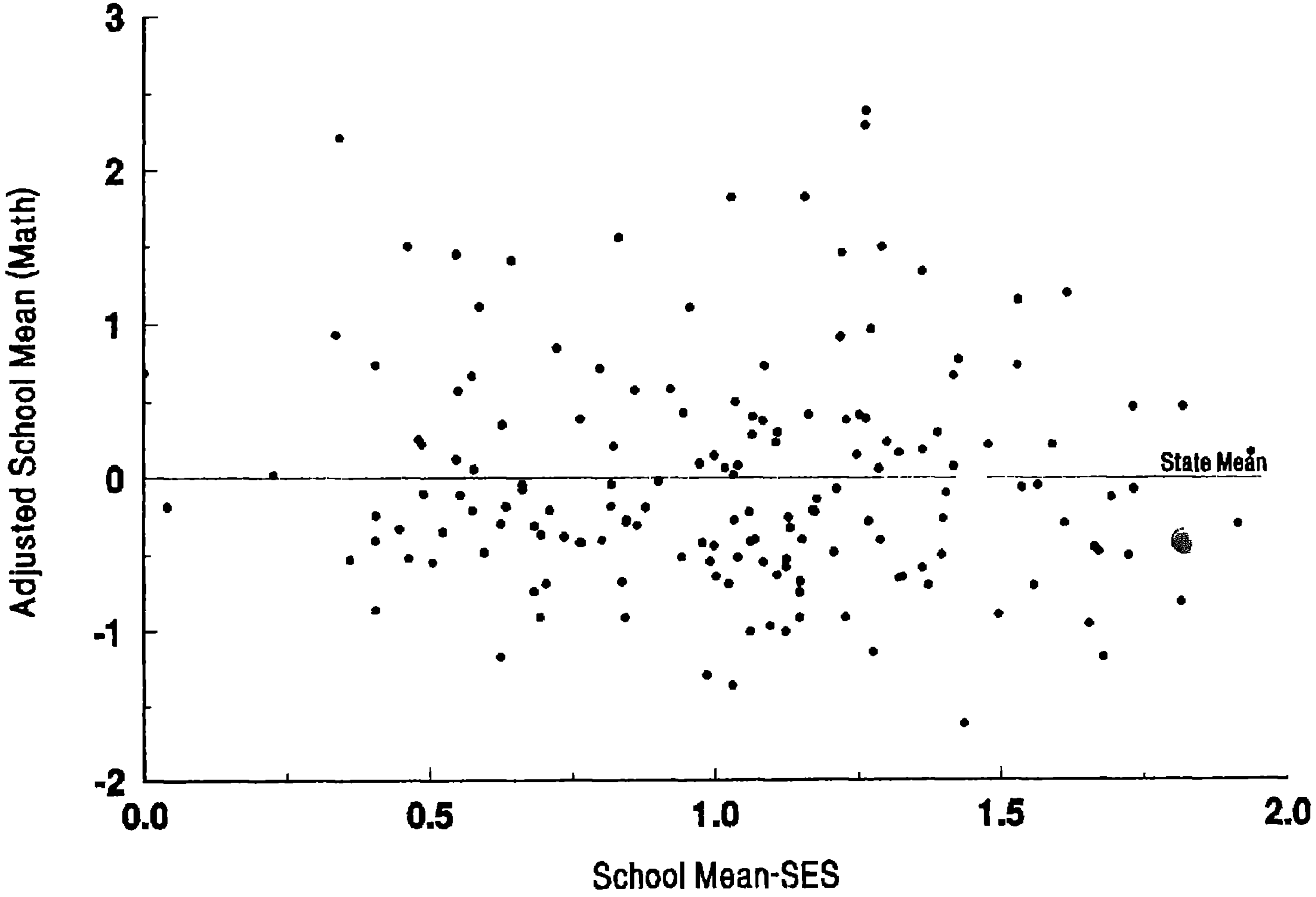


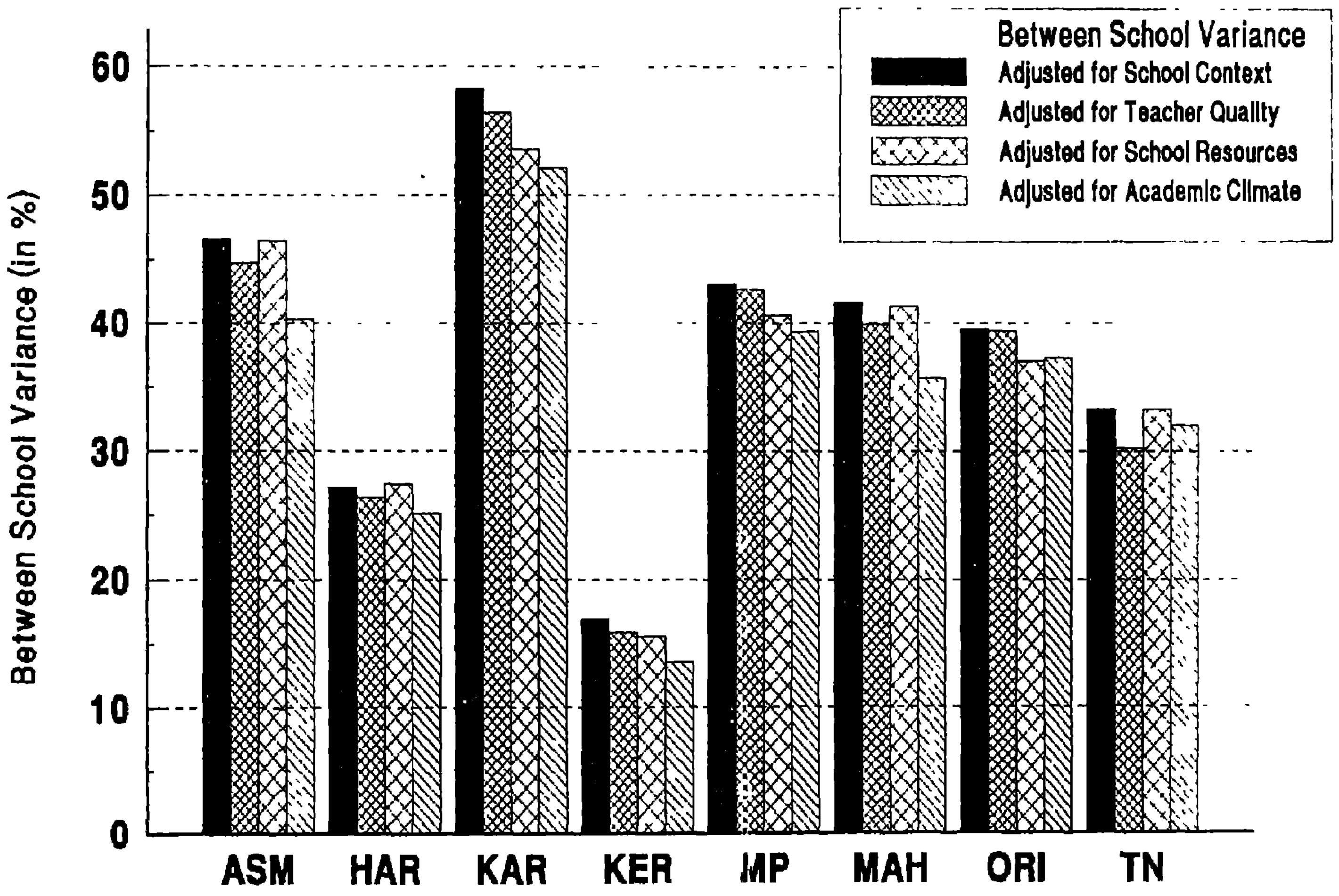
**Figure 2.4**

**Adjusted School Mathematics Mean Versus Mean-SES for Karnataka**



## Figure 2.5

## Between School Variance Adjusted for School Context, Teacher Quality, School Resources and Academic Climate (Mathematics)



## Figure 2.6
## Between School Variance Adjusted for School Context, Teacher Quality, School Resources and Academic Climate (Language)

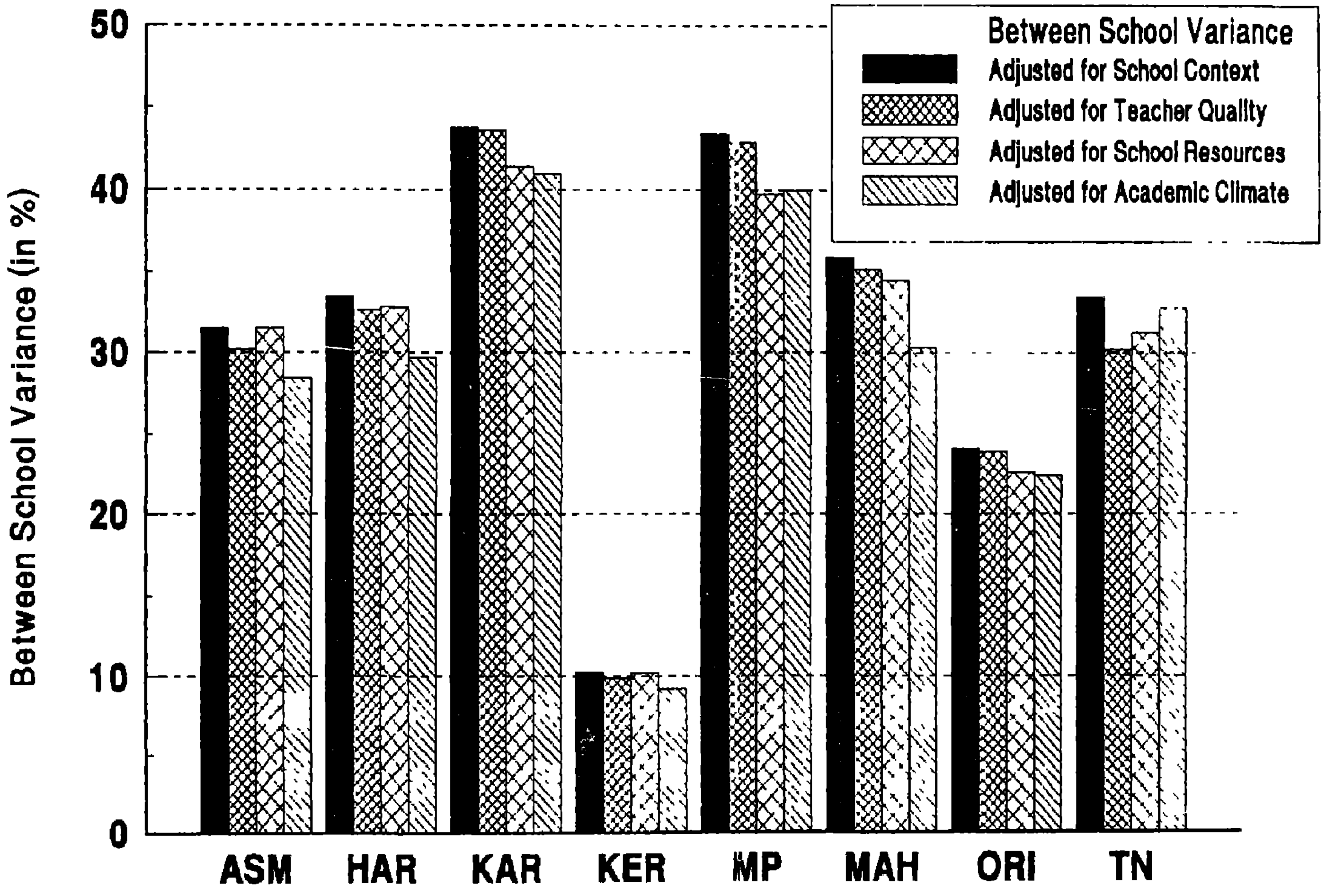
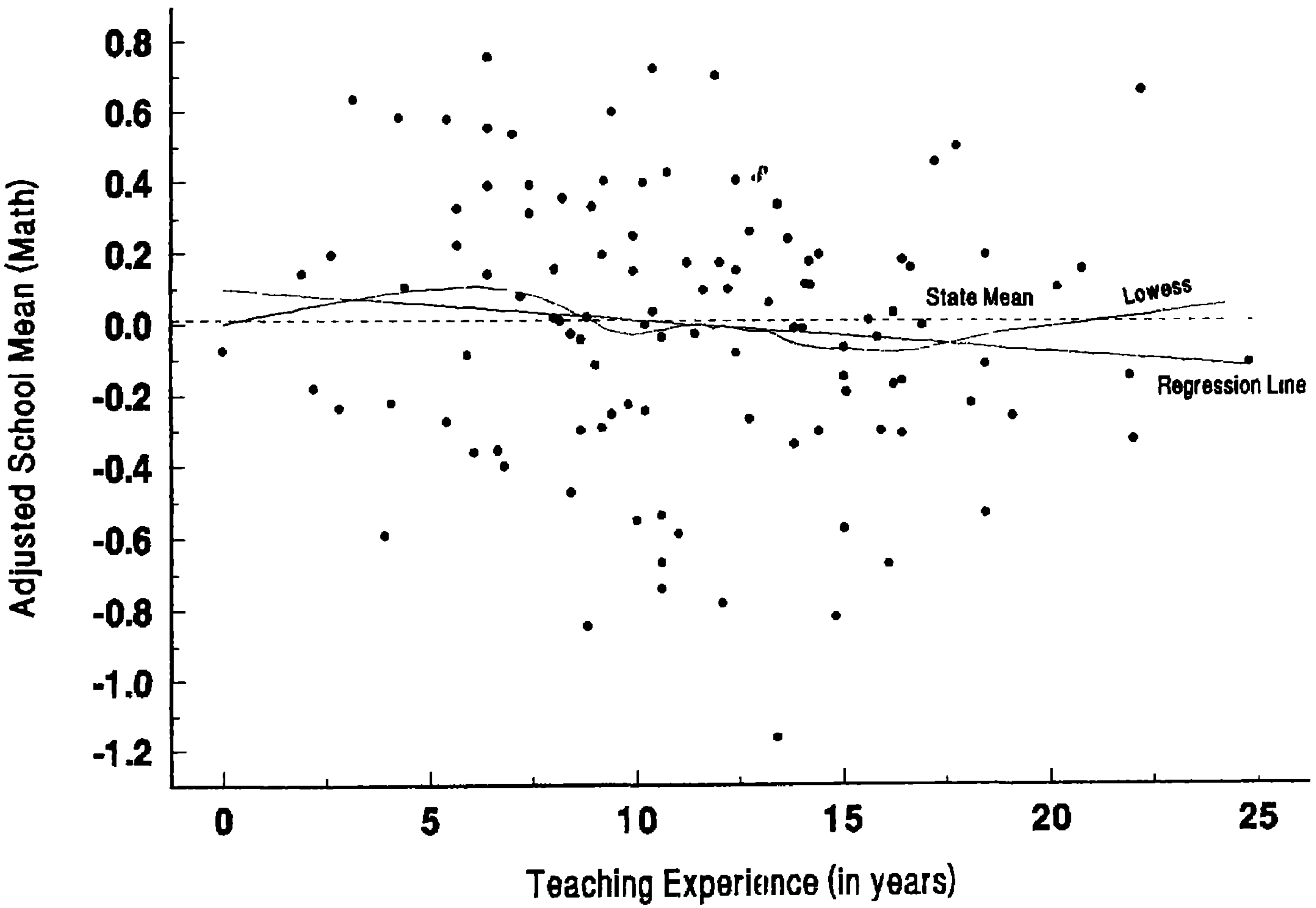


Figure 2.7

Adjusted School Mean in Mathematics Versus Teaching Experience for Kerala



### Figure 2.8

## Adjusted School Mean in Mathematics versus Pupil-Teacher Ratio for Madhya Pradesh

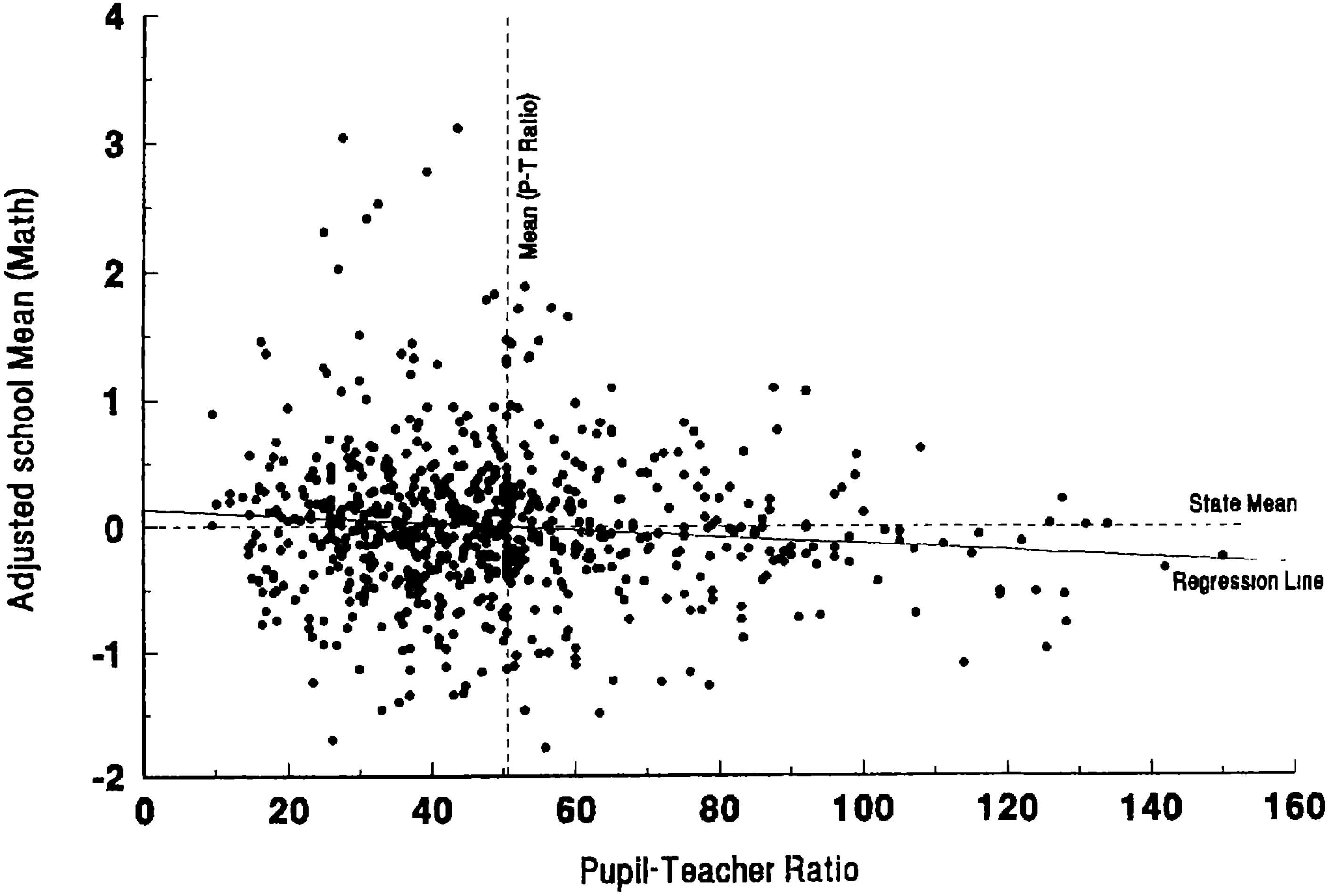
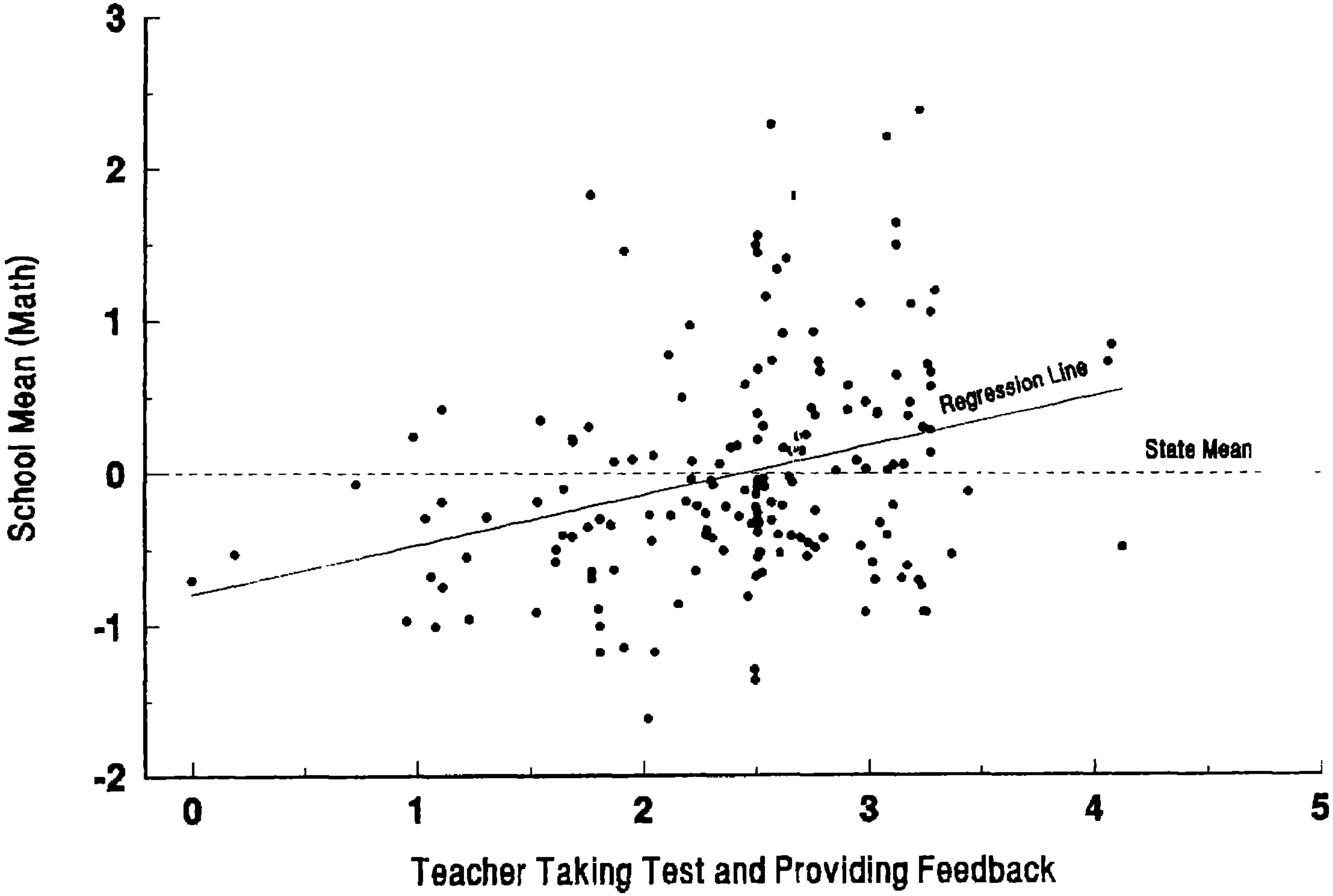


**Figure 2.9**

**School Mathematics Mean Versus Teacher Taking Test and Providing Feedback for Karnataka**



## Figure 2.10

# School Language Mean Versus Teacher Assigning Home Work for Maharashtra

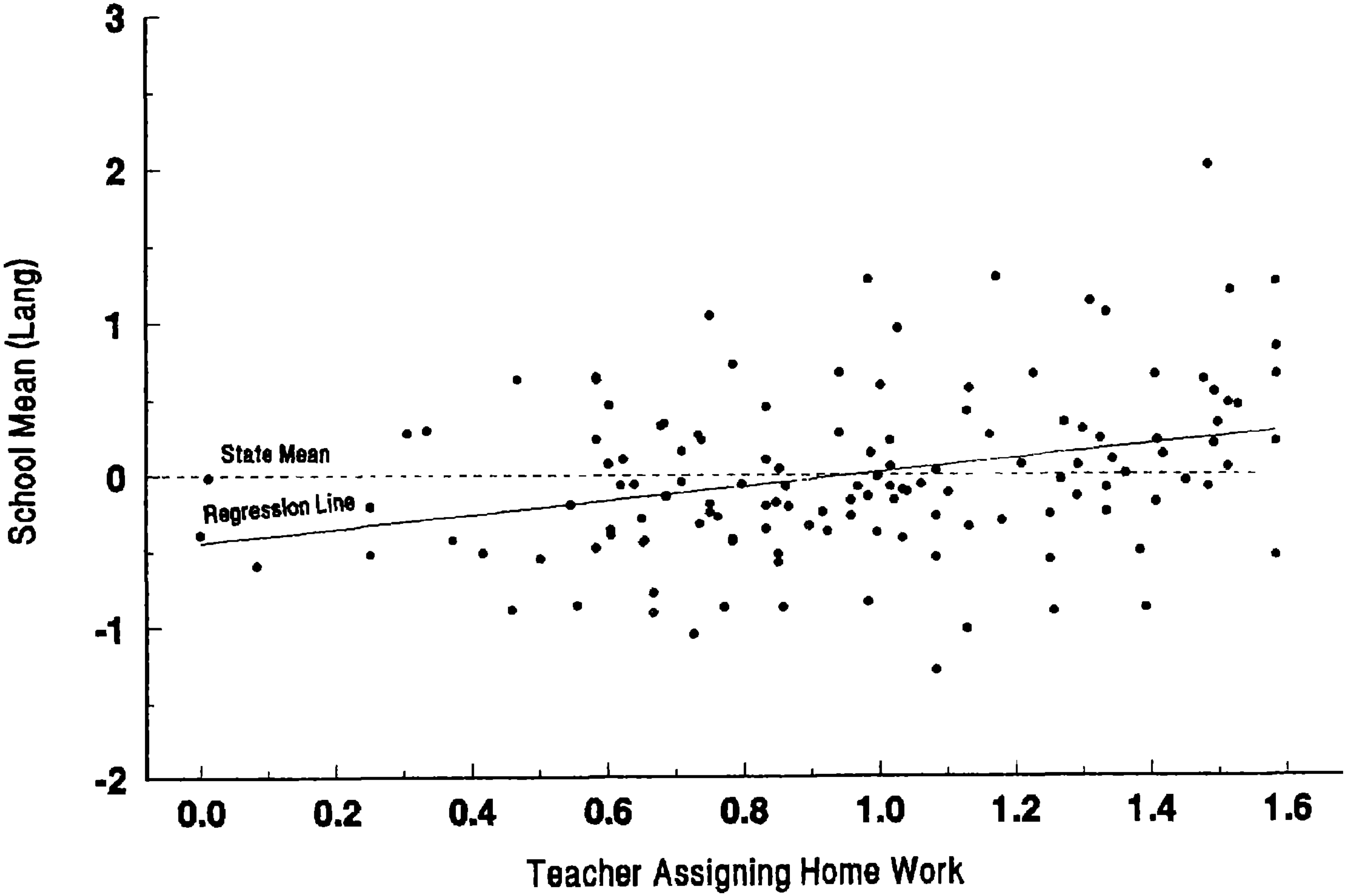
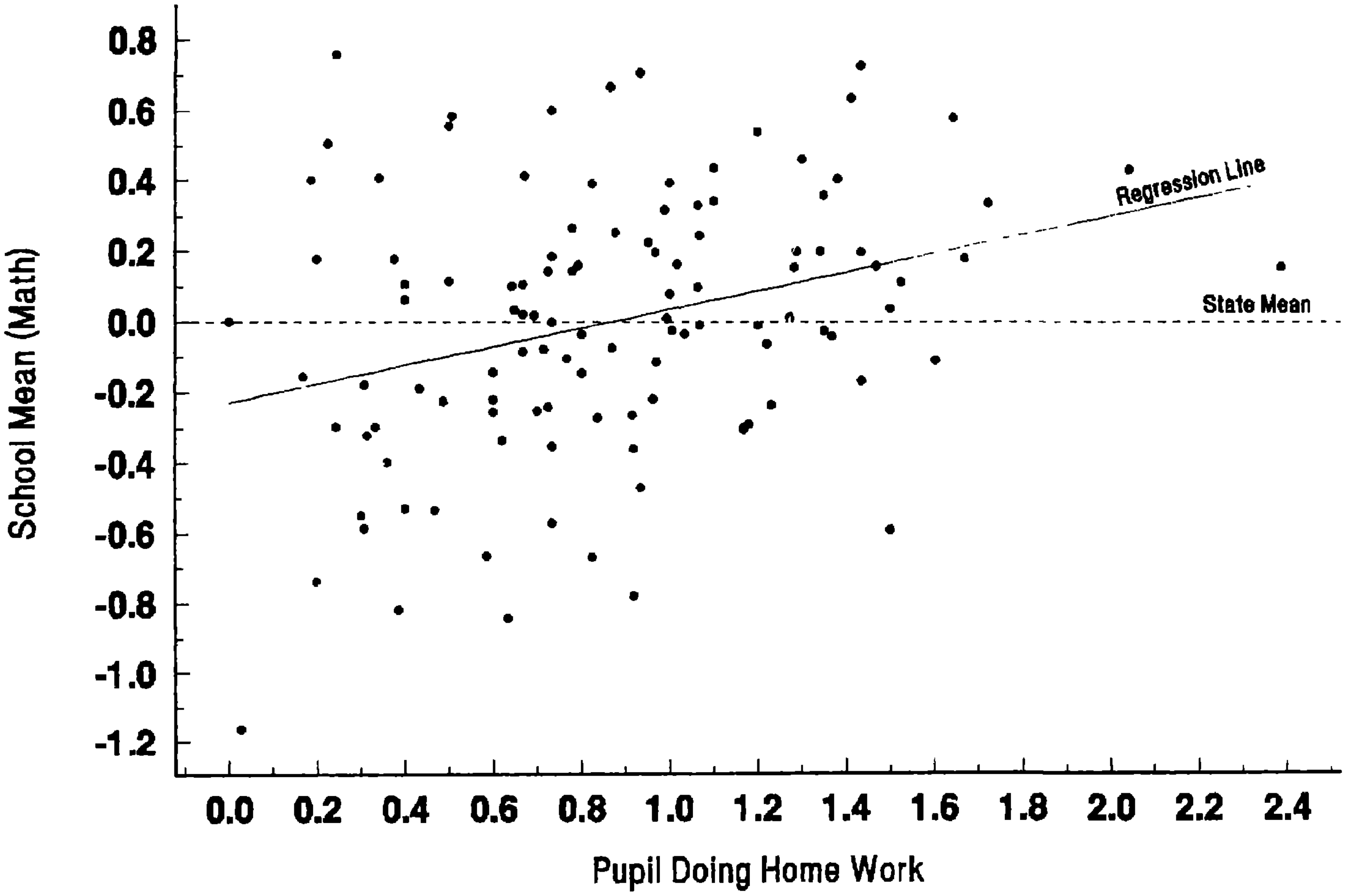


**Figure 2.11**

**School Mathematics Mean Versus Pupil Doing Home Work for Kerala**



## CHAPTER 3

# GENDER ACHIEVEMENT GAP AND SCHOOL EFFECTS

### Introduction

The new education policy, NPE-86, has specially emphasised on the removal of disparities and to equalize educational opportunity by attending to the specific needs of those who have been denied equality so far The obstacles inhibiting their access to, and retention in elementary education will receive overriding priorities, through provision of special support services, setting of time targets and effective monitoring. For the educational development of girls and other disadvantaged groups, certain measures in the form of incentives, scholarships, appointment of teachers from the disadvantaged groups, etc., have been suggested. Girls, being one of the disadvantaged group, are the target for study in this chapter. The main focus is on the gender gap, i.e., the difference in the learning achievement of boys and girls at the primary stage. The first question in this regard is whether there exists a gap in achievement of boys and girls? If so, what are the factors at the school level which are responsible for increasing or reducing this gap? The factors, as explained in Chapter 1, are grouped into three constructs, namely, teacher quality, school resources and school academic climate. Their effects are studied independently by including enblock the concerned group of factors to model the gender gap at school level.

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This chapter was written by V K. Jain and O.P. Arora.

The characteristics of the sample for the study are described (Table 3.1) in term of percentage of girls in grade IV/V and percentage of female teachers in the school. These two indicators would provide the comparative picture across states and also help later on in the interpretation of results in proper perspective.

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insert Table 3.1 here about

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It is observed that in the states of Orissa and Madhya Pradesh more than 20 per cent of the schools have only boys in them. Whereas in Kerala and Tamil Nadu states almost all the schools have girls representation. As regards the representation of female teachers in schools, it may be noted that in the states of Karnataka and Kerala all the schools have female teachers in them They represent more than 50 per cent of teachers in majority of the schools in both the states. On the other hand, in some other states there are large number of schools(more than 50 per cent) where not a single female teacher is working. Such states are Assam, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu Hence, there is a clear evidence of variation among the states with respect to the percentage of girls and the percentage of female teachers working in schools.

**The Achievement Gap Between Boys and Girls**

The differences between boys and girls in their achievement scores in both mathematics and language for all the eight states are already given in Tables 2.1 and 2.2 of Chapter 2. These

achievement gaps have been adjusted for the pupil's background and school context variables. The gender gaps and their variation across schools for all the states are reproduced in Table 3.2 from the point of view of reader's convenience. It may be noted that in mathematics the achievement gap between boys and girls, on average, is large in Assam, Haryana, Karnataka, Madhya Pradesh and Orissa. Whereas, in language the gap is large in Assam, Karnataka, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu. On average, girls score lower than boys by about 11 to 23 per cent of the respective standard deviations in both the subjects in the above mentioned states. Kerala state is the only exception, which shows no achievement gap between boys and girls in both mathematics and language.

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insert Table 3.2 here about

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The between school variance for gender achievement gap is large. This indicates that in some schools the gender achievement gap is large whereas in some other schools the gap is small. It also indicates that in some schools girls are performing poorer than boys and in some schools girls are doing better than the boys. This large variation of gap across schools is also applicable for the state of Kerala where no gender achievement gap is witnessed. The between school variance for gender gap varies from one state to another. In mathematics it is the lowest in Madhya Pradesh (7 per cent) and the highest in Maharashtra (28 per cent). In language, the corresponding figures are 6 per cent in Kerala and 24 per cent in Maharashtra.

### Effects of School Level Factors on Gender Achievement Gap

The gender achievement gap varies across schools within a state. This variation is due to difference in school policies and practices In order to explain the effect of school level factors on gender achievement gap three major constructs, viz., teacher quality, school resources and school academic climate are used. As mentioned earlier, the block of factors of a construct is taken independently for studying the contribution of each factor. The between school variances for gender achievement gap in mathematics and language adjusted for school context, teacher quality, school resources and school academic climate are presented graphically in Figure 3.1 and Figure 3.2 respectively.

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insert Figure 3.1 and Figure 3.2 here about
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While comparing the between school variances adjusted for teacher quality, school resources and school academic climate with the between school variance adjusted only for school context clear differences are found. The between school variance of achievement gap in mathematics is maximally reduced by the factors of school academic climate in the states of Haryana, Karnataka, Madhya Pradesh, Orissa and Tamil Nadu. Whereas in language the large reduction is explained by the factors of teacher quality. Further details about the specific contribution of each set of school level factors in reducing/ increasing the gender gap are studied separately in the subsequent sections.

### i) Effects of Teachers Quality Factors

The results of the four factors of teacher quality, viz., teacher qualification, teaching experience, inservice training, and period of stay of the teacher in the present school are presented in Table 3.3.

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insert Table 3.3 here about

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The factor of teacher qualification is widening the gender achievement gap in mathematics for the state of Kerala Whereas it is reducing the gap in language for Tamil Nadu. The reason for such a result for Kerala may be the type of schools. There are 59 per cent of schools as independent primary schools and remaining 41 per cent as extended primary schools(having higher grades also). The proportion of extended primary schools is the largest in Kerala as compared with all other states( refer primary in Table 7.3). The factor of teacher qualification, being the average qualification of all teachers in a school, is therefore inflated in this state. On the contrary in Tamil Nadu the teacher qualification is based on those teachers who are mostly working in the primary schools(86 percent). Hence, one can conclude that in independent primary schools teacher qualification help in reducing the gender achievement gap. This aspect is further displayed graphically in Figure 3.3 for language achievement in Tamil Nadu. It is clear from this figure that as the teacher qualification (in schooling years) increases the achievement gap not only reduces but also becomes positive. In this situation, gap size with negative sign indicates that girls are performing

lower than boys. The gap size with zero value gives no difference between the two. And positive value of gap indicates girls doing better than boys. This behaviour is represented by the regression line in relation to the average gap of the state.

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Insert Figure 3.3 here about
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The factor, inservice training, has shown a little impact on reducing the gender gap in language for Kerala and Madhya Pradesh.

The factor, duration of stay of a teacher in the present school, on average, widens the gender achievement gap in the state of Madhya Pradesh for mathematics and in Orissa for language. This gap, however, is reduced in language for Karnataka. It may be noted (Table 3.1) that Madhya Pradesh and Orissa have a very large number of schools (about 71 per cent and 53 per cent respectively) which do not have any female teacher in them. Perhaps, the large number of such schools are manned only by the male teachers and their longer stay in the same school have widened the gap in achievement of boys and girls. The situation is quite different in the state of Karnataka where not a single school is identified which is not represented by a female teacher. As such, the female teachers staying for a longer period in the same school tend to reduce the gender achievement gap In other words girls achievement improves with the stay of female teachers in the same school for a longer period.

The synthesis of results (Table 3.6) for teacher quality variables indicates that the inservice training tends to reduce

the gender gap in language.

### ii) Effects of School Resources Factors

Table 3.4 presents the contribution of school resources factors. The factor, access to teaching material, reduces the gender gap in mathematics for Assam. It indicates that if the teacher access to teaching material is increased by one unit, the achievement gap is likely to decrease by 9.5 per cent of a standard deviation.

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insert Table 3.4 here about
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The factor of educational facility in schools in Assam increases the achievement gap in mathematics. It may be possible because a large number of schools (more than 50 per cent) are exclusively manned by the male teachers. And the use of educational facility in teaching process by the male teachers may be more helpful in improving the performance of boys. As such, the educational facility is indirectly helping boys more rather than girls, which in turn results into widening the gender achievement gap.

The factor, number of teachers in a school, tends to widen the language achievement gap between boys and girls in the state of Karnataka. Again such a situation might be due to consideration of all the teachers of a school. About 43 per cent of the schools in Karnataka have in them higher grades in addition to the primary stage. Teachers of these schools have inflated the value of the factor. Hence, the direction of the

effect size may not be considered on its face value.

The factor, primary( with grades I to IV/V) as a type of school is widening the achievement gap in mathematics for Orissa and in language for Haryana. In other words, the achievement gap among boys and girls is large when they study in exclusively primary schools and this gap is small when they study in the extended primary schools. Perhaps, the latter type of schools provides better environment to girls which help them in improving their achievement.

The factor of percentage of female teachers in schools tends to reduce the gender achievement gap in mathematics for Madhya Pradesh and in language for Madhya Pradesh, Orissa and Tamil Nadu. On average, it tends to reduce the achievement gap in mathematics and language by 0.2 to 0.4 per cent of their respective standard deviations with every 1 per cent increase in female teachers in the school. This finding is further displayed graphically in Figure 3.4 for language achievement in Orissa state. The regression slope indicates the reduction in achievement gap as the percentage of female teachers in school increases.

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insert Figure 3.4 here about

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The synthesis of the results given in Table 3.6 indicates that factors of school resources fail to explain the gender achievement gap across the states and the results are also not consistent.

### (iii) Effects of School Academic Climate Factors

The effects of seven factors of school academic climate for both the subjects are given in Table 3.5. The factor of teacher giving arithmetic problem to solve in the class tends to widen the gap in mathematics achievement for the state of Madhya Pradesh and Orissa. This may be due to the fact that majority of schools in these states have only male teachers in them. In Madhya Pradesh, there are more than 70 per cent schools without female teachers and in Orissa 53 per cent. In the remaining schools also male teachers outnumber female teachers. Such a situation seems to be more helpful in improving the achievement of boys.

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insert Table 3.5 here ,about

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The factor, teacher assigning and correcting homework, tends to reduce the gender achievement gap in mathematics for Madhya Pradesh and also in Assam for language. A unit increase in the frequency of assigning home work tends to reduce the gap in achievement by 16.8 per cent and 28.7 per cent of their respective standard deviations. Figure 3.5 shows the school achievement gap of boys and girls in language versus teacher give homework in the state of Assam. It provides a clear picture of reducing the gender gap when the frequency of teacher assigning and correcting homework increases.

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insert Figure 3.5 here about

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The factor, parents involvement, reduces the gap in mathematics achievement for Assam whereas it widens the gap for Karnataka. Perhaps, in Assam, parents do not discriminate between boys and girls in regard to their education. And they provide equal opportunity to their sons and daughters to prosper.

The teacher commitment factor reduces the gender achievement gap in Tamil Nadu for mathematics. A unit increase in the teacher commitment would reduce the gap in mathematics achievement by about 25 per cent of a standard deviation. The graphical presentation in Figure 3.6 shows that on higher level of teacher commitment girls are performing better than boys.

The factor, head teacher as leader, tends to reduce the gender achievement gap in language for the state of Haryana. A unit increase in the frequency of head teacher instructional leadership would result into a reduction of 10.7 per cent of a standard deviation in the gender achievement gap.

The results of meta analysis(Table 3.6) indicate that the two factors, namely, inservice training, and teacher assigning and correcting homework tend to reduce the gender achievement gap in language.

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insert Table 3.6 here about
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The factor, teacher commitment, also tends to reduce the gender achievement gap between boys and girls in mathematics.

## Summary of Findings

Girls score lower than boys in all the eight states except Kerala, after adjustment for the pupil's background and the school context. The gap in achievement varies substantially across schools in all the eight states. It implies that in some schools girls perform lower than boys and in some other schools it is vice-versa.

Among the three constructs, school academic climate has accounted for the largest between school variance in mathematics. Whereas in language, it is the teacher quality.

Out of the four factors of teacher quality, the teacher qualification has reduced the achievement gap in language for Tamil Nadu. The second factor, viz., duration of stay of a teacher in the present school, has also indicated reduction in the achievement gap in Karnataka for language. On synthesis of results, it is noticed that the factor of inservice training has reduced the gap in language achievement. It has provided positive but weak association at state level.

Among the seven factors of school resources construct, access to teaching material has reduced the gender gap in mathematics for Assam. The other factor, primary( grades I to IV/V) as a type of school, has widened the achievement gap in mathematics for Orissa and in language for Haryana. It implies that the gap among boys and girls is large when they study in independent primary schools and this gap is small when they study in the schools having higher grades along with primary stage. Perhaps, the latter type of schools provide better environment to

girls in improving their achievement. The third factor, percentage of female teachers in schools, has reduced the gender achievement gap in mathematics for Madhya Pradesh and in language for Madhya Pradesh, Orissa and Tamil Nadu.

Out of the seven factors of school academic climate construct, the factor teacher assigning and correcting homework has reduced the gender achievement gap for mathematics in Madhya Pradesh and also in Assam for language. The factor, parents involvement, has reduced the gap in mathematics for Assam whereas it widens the gap in Karnataka. The factor, teacher commitment, has reduced the achievement gap in mathematics for Tamil Nadu. The factor of head teacher as leader has reduced the gender achievement gap in language for the state of Haryana.

## Table 3.1

## Schools According to Girls and Female Teachers

| State | Total Schools | Percentage of Schools with Girls(in %) | | | Female Teachers(in %) | | |
|---|---|---|---|---|---|---|---|
| | | 0 | 1 - 50 | 51-100 | 0 | 1 - 50 | 51-100 |
| ASM | 161 | 6 8 | 50.9 | 42.3 | 50.9 | 34.2 | 14.9 |
| HAR | 144 | 11 1 | 48 6 | 40.3 | 28 5 | 24.3 | 47.2 |
| KAR | 176 | 10.8 | 63.6 | 25.6 | 0.0 | 48.9 | 51.1 |
| KER | 113 | 0.0 | 66 4 | 33.6 | 2.7 | 40 7 | 56.6 |
| MP | 733 | 22.5 | 48.3 | 29.2 | 70.9 | 18.0 | 11.1 |
| MAH | 135 | 8.9 | 62.2 | 28.9 | 57.8 | 28.1 | 14.1 |
| ORI | 165 | 24 8 | 60.6 | 14.6 | 53.3 | 31.5 | 15.2 |
| TN | 119 | 0.8 | 69.7 | 29.5 | 51.3 | 27.7 | 21.0 |

Table 3.2

Gender gap and its Variation across schools after adjusting for Pupil's Background and School Context Variables

| Variable | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef<br>(SE) |
| M A T H E M A T I C S | | | | | | | | |
| Gender gap | -.130**<br>(.048) | -.232**<br>(.052) | -.108*<br>(.044) | -.063<br>(.045) | -.178**<br>(.025) | -.058<br>(.063) | -.150**<br>(.054) | -.043<br>(.049) |
| Residual Variances | | | | | | | | |
| Gender gap | .121** | .112** | .151** | .119** | .071** | .278** | .076* | .129** |
| L A N G U A G E | | | | | | | | |
| Gender gap | -.128**<br>(.052) | -.070<br>(.048) | -.105*<br>(.048) | .008<br>(.039) | -.197**<br>(.025) | -.156**<br>(.060) | -.156**<br>(.059) | -.117*<br>(.051) |
| Residual Variances | | | | | | | | |
| Gender gap | .138** | .085** | .157** | .060** | .088** | .242** | .095* | .148** |

* P < .05   ** P < .01

## Table 3.3
## Effects of School Level Variables - Teacher Quality

| Variables | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) |
| MATHEMATICS | | | | | | | | |
| Tch Qual | | | | -.158**<br>(.055) | | .077<br>(.051) | | |
| Tch Exp | | | | | | | | |
| Inservic | | | | | | | | |
| Stay Prd | | | 018<br>( 013) | | - 010*<br>(.005) | | | 017<br>(.009) |
| LANGUAGE | | | | | | | | |
| Tch Qual | .075<br>(.042) | | | | | .058<br>(.049) | .071<br>(.041) | .115**<br>(.046) |
| Tch Exp | | | | | | | | |
| Inservic | | | | .245<br>( 143) | .089<br>( 066) | | | |
| Stay Prd | | -.018<br>(.015) | 027*<br>(.013) | | | | -.042**<br>( 016) | .017<br>(.009) |

Note· the coefficient with p<.20 are reported
* p< 05 ; ** p<.01

## Table 3.4
## Effects of School Level Variables - School Resources

| Variables | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) |
| MATHEMATICS | | | | | | | | |
| Material | .095*<br>(.040) | | -.038<br>(.023) | | | | | |
| Ednl Facil | -.079*<br>(.032) | | -.026<br>( 018) | | | | | |
| Phy Facil | -.031<br>(.028) | | .024<br>( 018) | | | | | |
| No Tchr | | | | | | | | |
| P-T Ratio | | | | | | | | |
| Primary | .273<br>(.184) | | | | | | -.272*<br>( 133) | |
| Pct Fmtch | | | | .003<br>(.002) | 002*<br>(.001) | -.003<br>(.002) | 003<br>(.002) | |
| LANGUAGE | | | | | | | | |
| Material | | | | | | | | |
| Ednl Facil | -.046<br>(.028) | | .018<br>(.018) | | | | -.057**<br>(.019) | |
| No Tch | | .011<br>(.022) | -.047*<br>(.023) | | -.019<br>( 012) | | | -.032<br>(.020) |
| P-T Ratio | | | -.004<br>(.003) | | | .007<br>(.004) | | |
| Primary | | -.262*<br>(.127) | | | | -.183<br>(.122) | -.155<br>(.127) | |
| Pct Fmtch | | | | | 002*<br>(.001) | | 004*<br>(.002) | .004*<br>(.002) |

Note. the coefficient with p< 20 are reported
*p<.05 ; ** p< 01

## Table 3.5
## Effects of School Level Variables - School Academic Climate

| Variables | ASM<br>Coef.<br>(SE) | HAR<br>Coef.<br>(SE) | KAR<br>Coef.<br>(SE) | KER<br>Coef.<br>(SE) | MP<br>Coef.<br>(SE) | MAH<br>Coef.<br>(SE) | ORI<br>Coef.<br>(SE) | TN<br>Coef.<br>(SE) |
|---|---|---|---|---|---|---|---|---|
| MATHEMATICS | | | | | | | | |
| Math problem | | -.244<br>(.164) | | | -.195*<br>(.081) | -.084<br>(.191) | -.433*<br>(.197) | |
| Test fdback | | | | | | | | |
| Tch give HW | .226<br>( 135) | | | | .168*<br>(.078) | | | -.275<br>(.154) |
| Ppl do HW | | | | | | | | |
| Tch commit | | | | .191<br>(.108) | | | .195<br>(.117) | .251*<br>(.126) |
| Prnt invl | .142*<br>(.068) | -.092<br>(.071) | -.091*<br>(.047) | | | | | |
| Ht leader | | | | | | | | |
| LANGUAGE | | | | | | | | |
| Read dictn | | | | | | | | |
| Test fdback | | | | | | | | |
| Tch give HW | .287*<br>(.133) | | | .275<br>(.160) | | | | |
| Ppl do HW | | | | | | | | |
| Tch commit | | | | | | | | |
| Prnt invl | | -.097<br>(.065) | | | .037<br>(.025) | | | |
| Ht leader | | .107*<br>(.053) | | | | | | .092<br>(.053) |

Note: the coefficient with p<.20 are reported
* p<.05 ; ** p<.01

## Table 3.6
## Result of Meta Analysis on Gender Gap for School Factors

| Variable | Mathematics | | Language | | Residual variance | |
|---|---|---|---|---|---|---|
| | Coef | (SE) | Coef. | (SE) | Math | Lang |
| Teacher Quality | | | | | | |
| Tch Qual | - 040 | (.117) | .080 | (.022) | .02480** | .00001 |
| Tch Exp | | | | | | |
| Inservice | - | - | 117* | (.063) | - | .00052 |
| Stay Period | .006 | ( 010) | -.002 | (.016) | 00022** | .00079** |
| School Resources | | | | | | |
| Material | .024 | ( 066) | - | - | .00778** | - |
| Ednl Facil | -.046* | ( 026) | - | - | .00073 | - |
| Phy Facil | 001 | (.027) | -.027 | (.025) | .00137* | .00096 |
| No Tchr | - | - | -.021* | (.009) | - | .00001 |
| P-T Ratio | - | - | .001 | (.005) | - | .00005* |
| Primary | -.014 | (.272) | -.200 | (.072) | .12274* | .00007 |
| Pct FmTch | .001 | (.001) | .001 | (.002) | .00000 | .00001** |
| School Academic Climate | | | | | | |
| Math problem | -.215* | (.065) | - | - | 00015 | - |
| Read & dictn | | | | | | |
| Test & fdback | | | | | | |
| Tch give HW | .056 | ( 147) | 282* | (.102) | 04969* | .00001 |
| Ppl do HW | | | | | | |
| Tch commit | .209* | (.067) | - | - | .00006 | - |
| Prnt Invl | -.017 | ( 076) | - 017 | (.066) | .01361* | .00655* |
| Ht Leader | - | - | 100 | ( 038) | - | .00001 |

* P< .05 ** P< 01

## Figure 3.1

## Between School Variance for Gender Gap Adjusted for School Context, Teacher Quality, School Resources and Academic Climate (Mathematics)

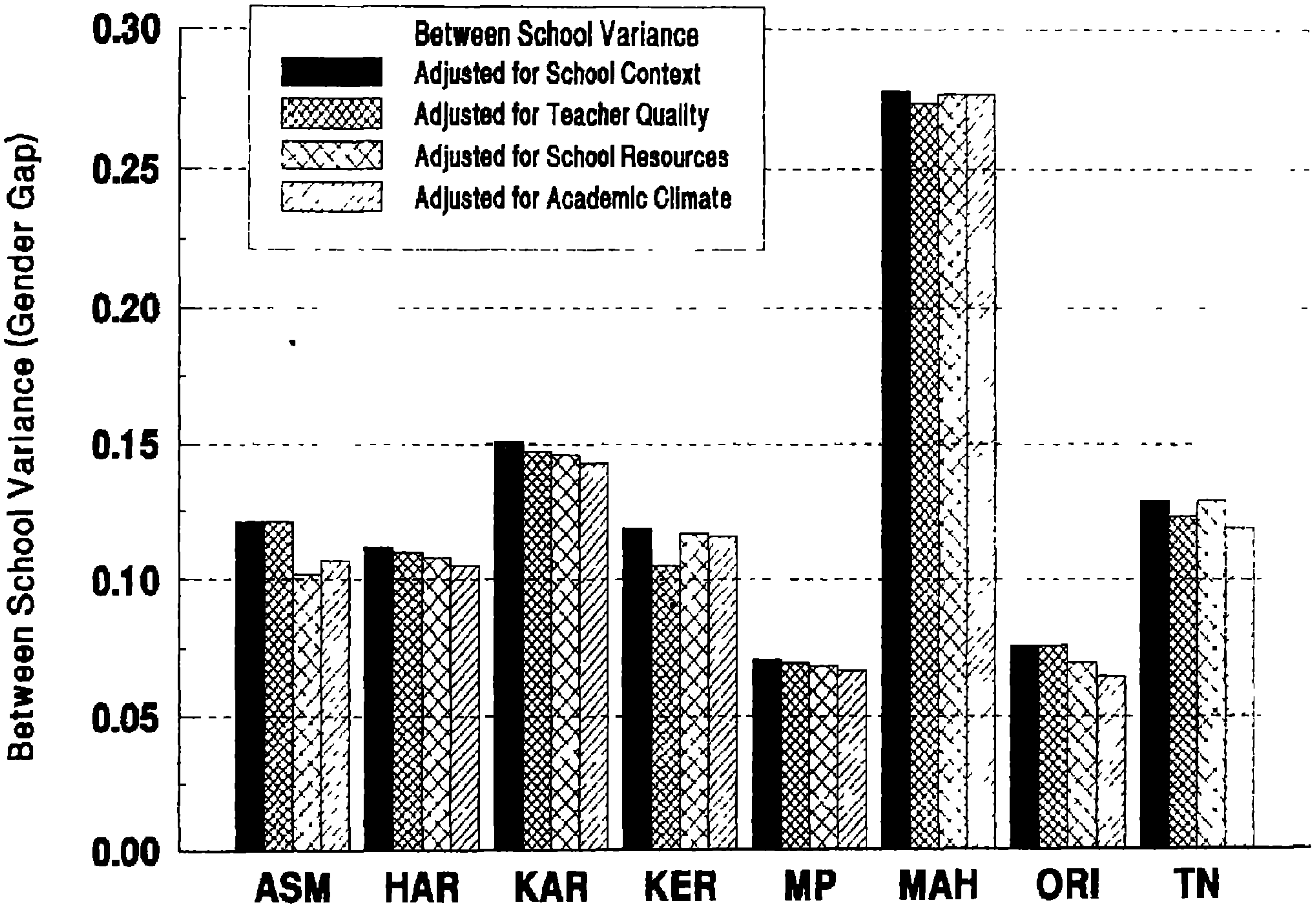
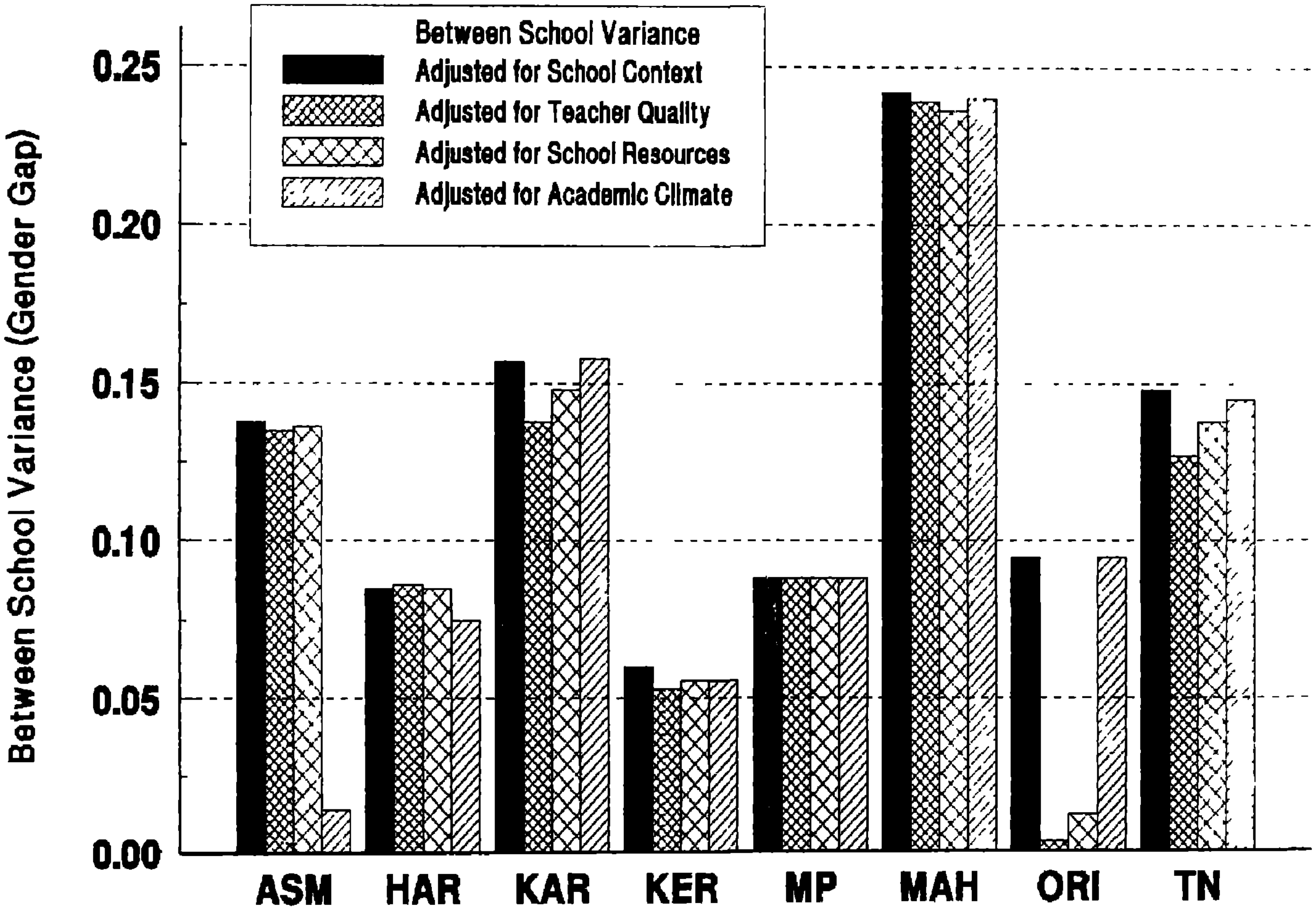


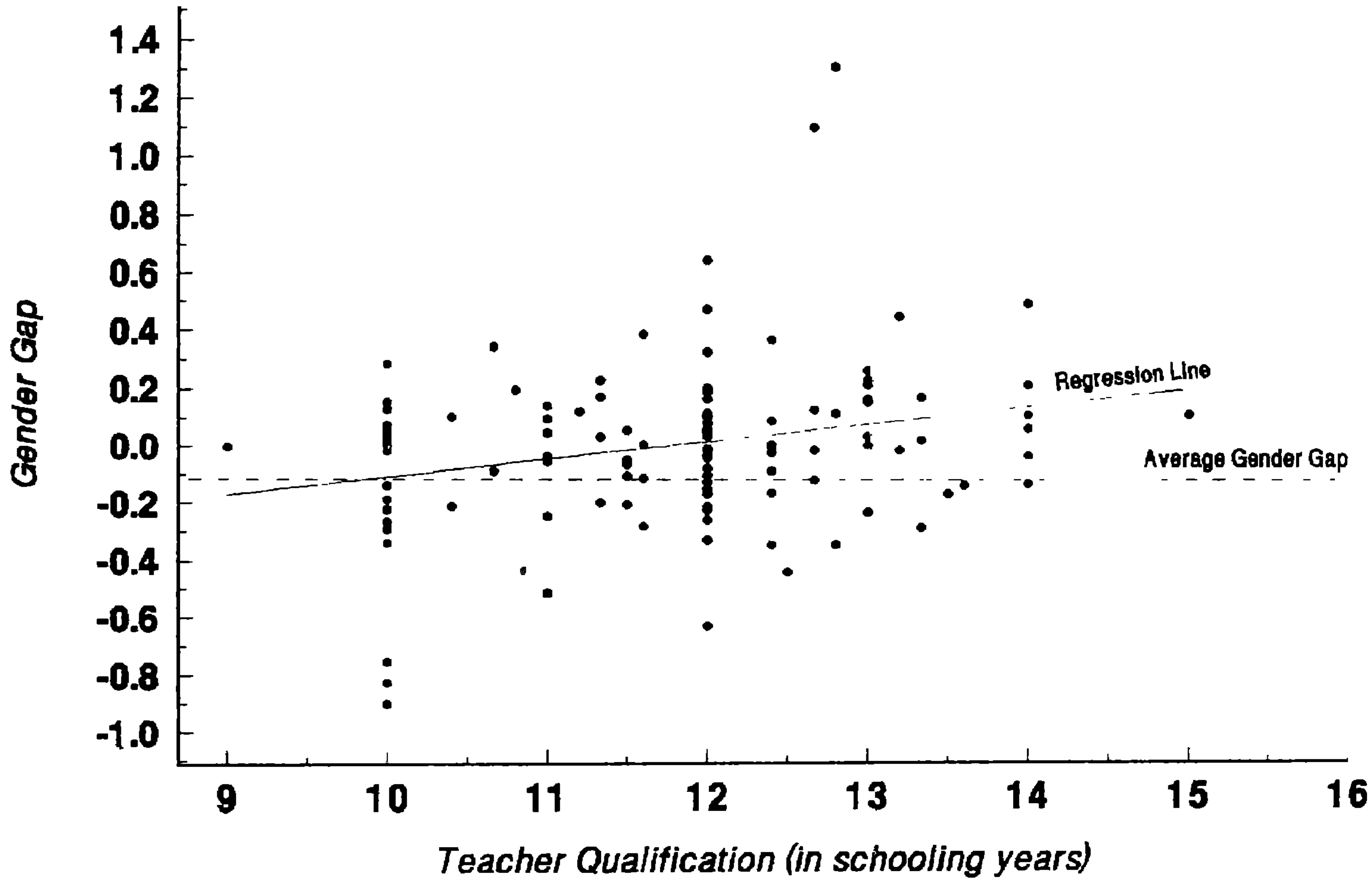
**Figure 3.2**

**Between School Variance for Gender Gap Adjusted for School Context, Teacher Quality, School Resources and Academic Climate (Language)**

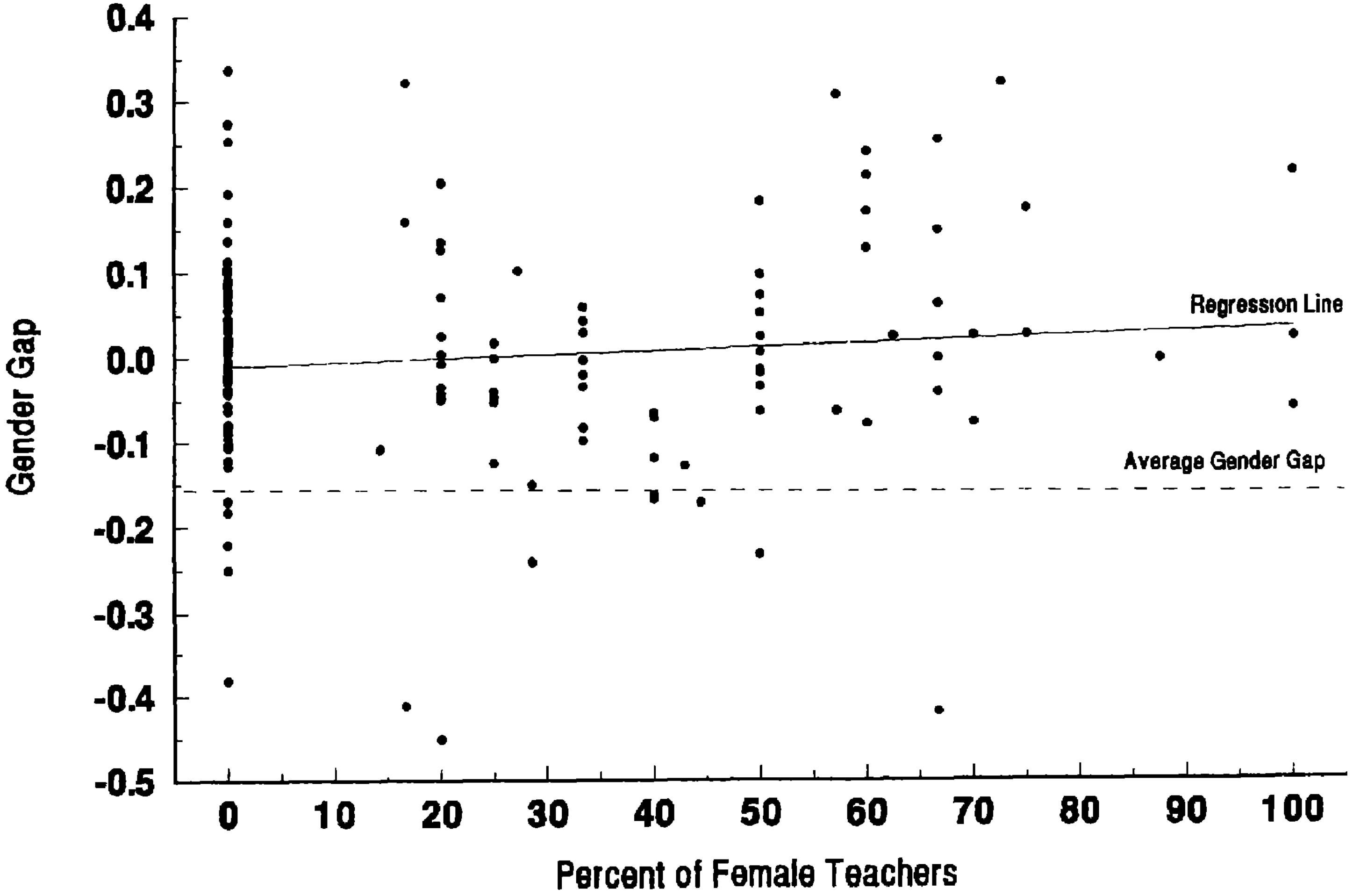


## Figure 3.3

## Effect of Teacher Qualification on Gender Achievement Gap in Tamil Nadu (Language)

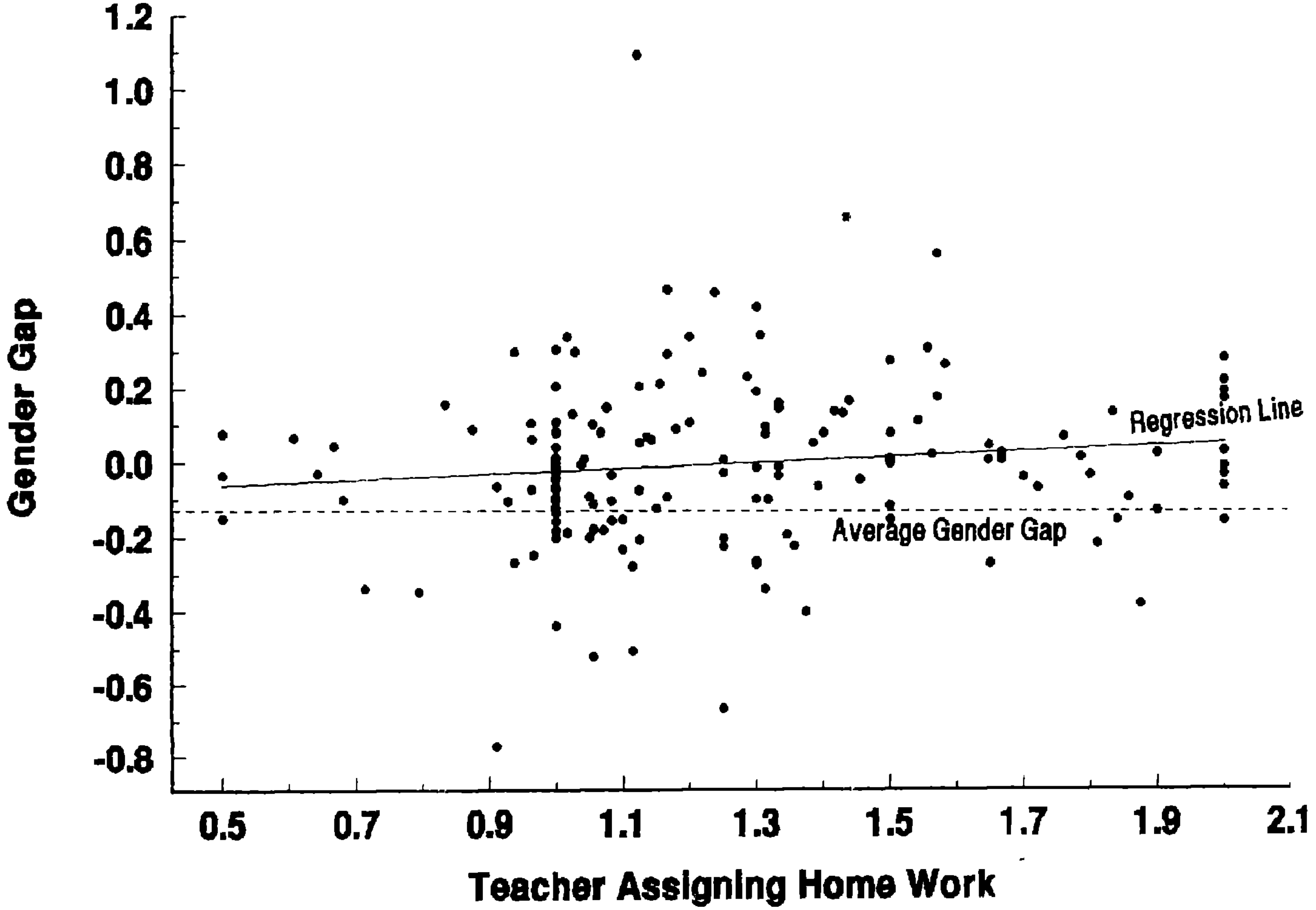


## Figure 3.4
## Effect of Female Teachers on Gender Achievement Gap in Orissa (Language)



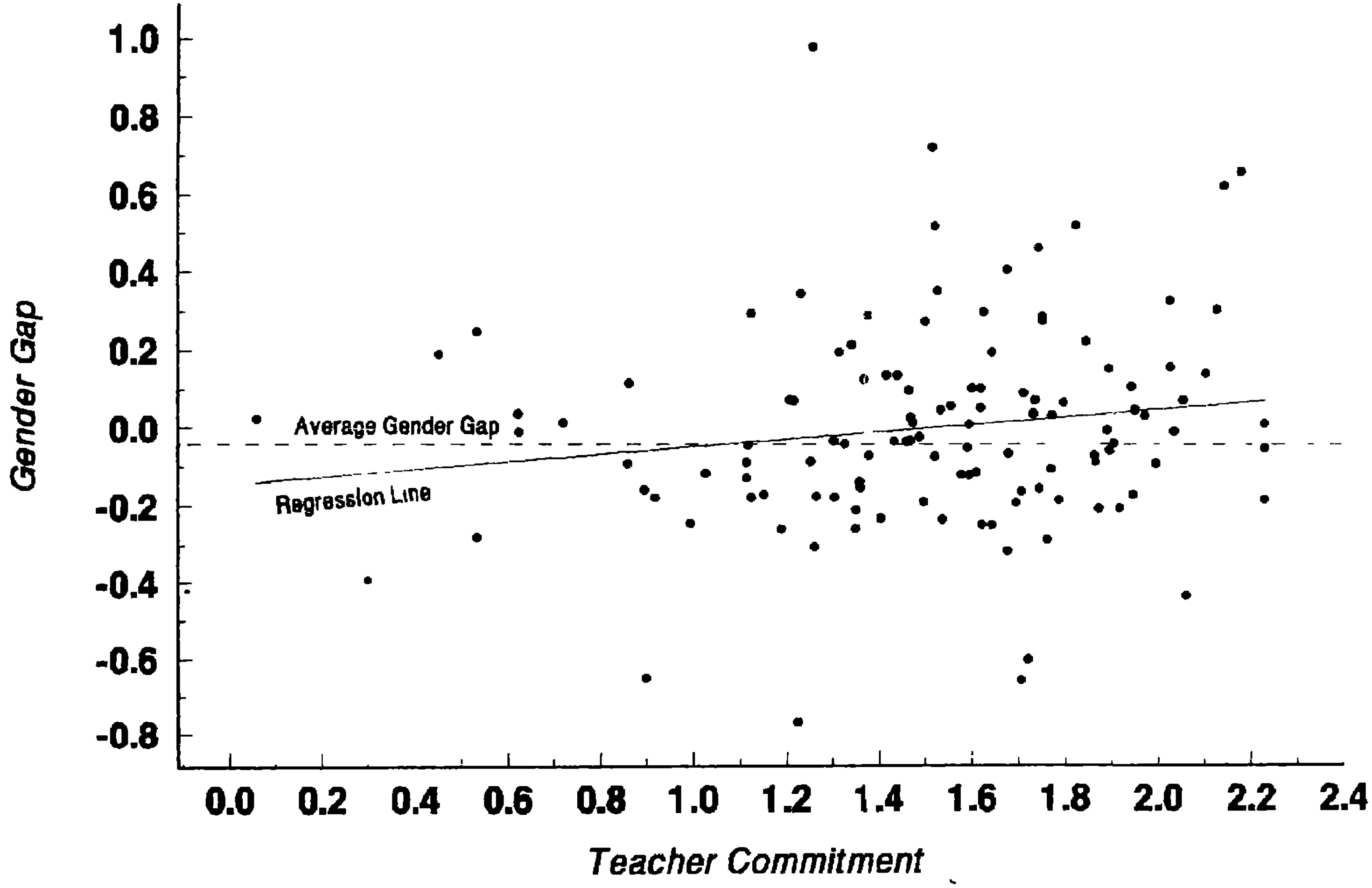
## Figure 3.5

## Effect of Teacher Assigning Home Work on Gender Achievement Gap in Assam (Language)



## Figure 3.6

## Effect of Teacher Commitment on Gender Achievement Gap In Tamil Nadu (Mathematics)



# CHAPTER 4

# SC/ST ACHIEVEMENT GAP AND SCHOOL EFFECTS

The Constitution of India provides special concessions to the deprived and disadvantaged sections of the society, to enable them to catch up with the rest of the population in the process of development. In pursuance of Article 341 and 342 of the Constitution, certain castes and tribes have been included in the Schedule on the basis of their social and economic backwardness. These are classified as 'Scheduled Castes'(SC) and 'Scheduled Tribes'(ST).

Article 46 of the Constitution prescribes that

> "The state shall promote with special care the education and economic interests of the weaker sections of the people, and in particular, of the Scheduled Castes and Scheduled Tribes and shall protect them from social injustice and all forms of exploitation "

As per the constitutional commitment special emphasis has been laid down for these disadvantaged groups in all sectors of planning, including education, right from inception. To attain the cherished goal of UEE, the NPE-86 states that

> " The new policy will lay special emphasis on the removal of disparities and to equalise educational opportunity by attending to the specific needs of those who have been denied equality so far".

Methodologically, UEE has taken into account both quantitative and qualitative aspects of educational development.

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This chapter was written by K.B. Rath and R.R. Saxena.

The present chapter deals with the learning achievement of SC/ST students. The first question addressed is whether there exists the achievement gap between SC/ST and non-SC/ST students in mathematics and language. The next question is which of the school level factors are associated with the difference in learning achievement amongst SC/ST and non-SC/ST students.

The discussion starts with the distribution of SC/ST students in the sample, a basis of the present study. Then the difference between SC/ST and non-SC/ST students on their achievement scores in mathematics and language in the eight DPEP states is examined. The estimated difference between these two groups is further studied to find out whether it is within schools or extended to across schools. The within school variation is attributable to pupil's background, which lies outside the control of the school system This variation is adjusted for the student's background factors for estimating the actual effects of school level factors on SC/ST gap. The school level factors under three constructs, namely, teacher quality, school resources, and school academic climate contributing to this difference are studied in this chapter in a systematic order. The findings are summarised at the end of this chapter

## Background Characteristics of SC/ST Students

All students included in the study are classified into two groups One group consists of students belonging to SC or ST and labeled as SC/ST whereas the rest of the students form the other group and labeled as non-SC/ST. Altogether there are 5,292 SC/ST

and 17,771 non-SC/ST students which formed the basis of this study. Figure 4.1 depicts the school mean percentage of SC/ST students in each of the eight states covered under the study The highest percentage(48.23) of SC/ST students is in Orissa and the lowest(11.41) in Kerala Further, different levels of concentration of SC/ST students in the schools of different states are shown in Figure 4.2 Among all the states, Orissa has the highest percentage of schools with more than 75 per cent of SC/ST students whereas Kerala does not have any such school However, in Kerala majority of schools have up to 25 per cent of SC/ST students. In fact, in all the states SC/ST students are unevenly distributed.

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Insert Figure 4.1 and Figure 4.2 here about

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Table 4.1 presents pupil's background of SC/ST and non-SC/ST students in terms of mean and standard deviation of father's education, mother's education and father's occupation. The results indicate that mean values of all the three variables are low for the SC/ST pupils as compared to non-SC/ST in all the states. Comparison of different states on these variables indicates that father's and mother's education have the lowest variance for the state of kerala. On average, women, both SC/ST and non-SC/ST, in Kerala are educationally better placed than those in other states On the other hand, fathers of SC/ST students in kerala pursue very low level of occupation as compared to their non-SC/ST counterparts in the state. Even within SC/ST occupation across states, it is the lowest.

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insert Table 4.1 here about

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**Difference in Achievement between SC/ST and Non-SC/ST**

The achievement status of SC/ST and non-SC/ST students is derived initially by comparing their raw mean scores on language and mathematics The results are presented in Figure 4.3 for mathematics and in Figure 4 4 for language. The common trend emerging out of the mean scores indicates that, by and large, SC/ST students have low attainment than non-SC/ST invariably in all the states on both the subjects In Karnataka and Orissa, SC/ST students score distinctly lower in mathematics than non-SC/ST students. However, the mean scores of SC/ST on mathematics is not discernibly different from that of non-SC/ST in Maharashtra and Tamil Nadu. In language achievement, the mean score of SC/ST is definitely lower than that of non-SC/ST in all the states except in Maharashtra.

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Insert Figure 4.3 and Figure 4.4 here about

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The simple mean achievement scores contain effects of pupil's background and school level factors In order to estimate the size of the achievement gap between SC/ST and non-SC/ST students, the effect of pupil's background variables (girl, mother's education, father's education, father's occupation and repeat) is partialed out The estimates for the unadjusted and adjusted effects and their variations are presented in Table 4.2.

insert Table 4.2 here about

In mathematics, the unadjusted variance (Table 4.2) is almost negligible in all the states except in Madhya Pradesh. However, after adjusting for other background variables, it became negligible in this state also. It means that the variation of SC/ST achievement gap in mathematics is confined to within school only. Conclusions stemming from this results are: a) On average, SC/ST students within schools have low mathematics achievement score as compared to non-SC/ST; and b) this level of attainment is accounted for the intake composition characteristics, i.e., the ability level of the students and their family background characteristics.

In language, the adjusted variation in achievement gap across the schools is not discernible in all the states except that in Karnataka and Kerala. The variation in the gap across schools in Karnataka and Kerala indicates that in some schools SC/ST students performed better in language than the average achievement gap and vice-versa Probably, the mother tongue and the medium of instruction are the same for both SC/ST and non-SC/ST in Karnataka and Kerala. Contrary to it, in other states, where between school variance is not discernible, it may be due to the fact that the ST community have their own tribal dialect whereas language taught in school is different Needless to say that the language learning process may be facilitated through the interaction with family members at home and also accommodated in school environment. The other reason might be

that perhaps, schools are not adopting suitable teaching strategies which could be in tune with the cognitive level of SC/ST students.

It is observed from Figure 4.5 and 4.6 that the gap in achievement between SC/ST and non-SC/ST has decreased for both the subjects in all the states after adjustment of pupil's background. The reduction is quite noticeable in the states of Assam, Maharashtra and Orissa. The gap in mathematics achievement for Orissa became negligible when it was discernible earlier. A similar result is obtained in the case of language achievement in Orissa. The achievement gap between SC/ST and non-SC/ST students varies across states in both the subjects. Kerala state has recorded the highest gap in mathematics and language with 23.4 per cent and 38.4 per cent of their respective standard deviations. It implies that SC/ST students perform very poor in both the subjects as compared to non-SC/ST in Kerala. Further, the achievement gap is the lowest in Madhya Pradesh in both the subjects (6.1% in mathematics and 7.5% in language of their respective standard deviations). In Haryana, Karnataka, Kerala and Madhya Pradesh the low attainment level of SC/ST in mathematics (Figure 4.5) prevailed even after controlling for the pupil's background variables. In language, as revealed by Figure 4.6, the low performance of SC/ST is apparent in Haryana, Kerala and Madhya Pradesh.

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Insert Figure 4.5 and Figure 4 6 here about

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The meta analysis with known variance is applied separately for mathematics and language. The results in Table 4.3 indicate

that average achievement gap is distinct in both language and mathematics The analysis further points out that the variation in the achievement gap across states in mathematics is not discernible. On the other hand, estimates of the gap in language achievement discernibly vary across the states. These findings indicate that SC/ST students across states score lower than non-SC/ST students by about 9 per cent of a standard deviation in mathematics. Whereas in language SC/ST students score lower than non-SC/ST students by 10 per cent of a standard deviation.

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insert Table 4.3 here about
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**Effect of School Level Variables on Achievement Gap**

The achievement gap between SC/ST and non-SC/ST in mathematics does not vary across schools within a state. This is true for all the states. Whereas, the gap in language achievement varies across schools only in the state of Karnataka and Kerala. The analysis of variation in achievement gap for language in the states of Karnataka and Kerala is further carried out to estimate the contribution of school level factors, viz, teacher quality, school resources and school academic climate. The results of this analysis are given in Table 4.4.

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insert Table 4.4 here about
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In Karnataka, the component of between school variance for SC/ST achievement gap is found to be reduced by 8.5, 5.7 and 8.5

per cent for teacher quality, school resources and school academic climate respectively. The corresponding figures for Kerala are 3.6, 5.0 and 38.3 per cent. It indicates that the school academic climate explains maximum variance in SC/ST gap across schools. (Results not shown in a table.)

The factor of teaching experience is widening the SC/ST achievement gap in language for Karnataka. As the years of teaching experience increases by one year the SC/ST gap in language achievement widens by 1.3 per cent of a standard deviation. Figure 4 7 indicates that teachers with initial up to ten years of experience reduces the SC/ST achievement gap. And when teaching experience increases beyond ten years, it tends to widen the achievement gap between SC/ST and non-SC/ST students. Perhaps, job of teaching gradually becomes monotonous and teacher loses motivation to work.

Insert Figure 4.7 here about

Under school resources, none of the factors provide discernible effect on the SC/ST achievement gap in language in both the states.

The factor of test and feedback, under school academic climate has provided a strong and discernible effect on SC/ST achievement gap in language for Kerala. As the frequency of teacher taking the test and providing feedback increases the SC/ST achievement gap reduces substantially. If frequency of taking test and providing feedback is increased by one unit the gap would reduce by 41.8 per cent of a standard deviation. This

factor appears to be the most effective among all school level factors.

The factor, parents involvement has provided a distinct help in reducing the SC/ST achievement gap in the state of Karnataka. If parents involvement is increased by one unit the SC/ST achievement gap in language would decrease by 13.4 per cent of a standard deviation.

**Summary of Findings**

The present study is based on a sample comprising 5,292 SC/ST and 17,771 non-SC/ST students of grade IV/V in 43 DPEP districts of eight states, viz., Assam, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu. The percentage of SC/ST children is the highest in Orissa (about 48%) and the lowest in Kerala (about 11%). Further, the average father's education, mother's education and father's occupation are lower than those of non-SC/ST students.

The SC/ST students, after adjustment for the pupil's background variables, have low attainment level than non-SC/ST in Mathematics and language achievement for Haryana, Kerala and Madhya Pradesh. In addition to these states, SC/ST students have scored lower in only mathematics for the state of Karnataka. Further, the result of meta analysis has revealed that the SC/ST students have performed lower than the non-SC/ST students in both mathematics and language achievement.

The achievement gap across schools in mathematics has negligible variation in all the states whereas, in language it has a discernible variation for the state of Karnataka and

Kerala. It means low attainment of SC/ST students on mathematics is accountable to the effect of home background and pupils' characteristics. Whereas, in language some of the school level variables have accounted for SC/ST achievement gap in Karnataka and Kerala.

Out of the three constructs of school level factors, the school academic climate explains maximum variance (8.5% in Karnataka and 38.5% in Kerala) in SC/ST gap across schools.

The factor of teaching experience is widening the SC/ST achievement gap in language for Karnataka.

Under school resources, none of the factors provide discernible effect on the SC/ST achievement gap in language in both Karnataka and Kerala states.

The factor of test and feedback, under school academic climate has provided a strong and discernible effect on SC/ST achievement gap in language in Kerala

The factor, parents involvement has provided a distinct help in reducing the SC/ST achievement gap in the state of Karnataka.

## Table 4.1

### Mean and SD of Student's Background Variables

| Variable | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Mean<br>(SD) | Mean<br>(SD) | Mean<br>(SD) | Mean<br>(SD) | Mean<br>(SD) | Mean<br>(SD) | Mean<br>(SD) | Mean<br>(SD) |
| Father's Education | | | | | | | | |
| SC/ST | 2.44 | 2.30 | 2.17 | 2.69 | 2.47 | 3.04 | 2.13 | 2.50 |
| | (1.39) | (1.48) | (1.48) | (0.93) | (1.43) | (1.69) | (1.36) | (1.38) |
| non-SC/ST | 2.82 | 2.77 | 2.77 | 2.86 | 3.14 | 3.32 | 3.00 | 2.70 |
| | (1.55) | (1.58) | (1.52) | (0.90) | (1.51) | (1.66) | (1.61) | (1.38) |
| Mother's Education | | | | | | | | |
| SC/ST | 1.82 | 1.25 | 1.44 | 2.64 | 1.39 | 1.91 | 1.46 | 1.96 |
| | (1.24) | (0.73) | (0.99) | (0.99) | (0.90) | (1.38) | (0.92) | (1.23) |
| non-SC/ST | 2.25 | 1.54 | 2.00 | 2.88 | 1.86 | 2.23 | 2.28 | 2.08 |
| | (1.38) | (1.09) | (1.35) | (0.88) | (1.26) | (1.43) | (1.37) | (1.24) |
| Father's Occupation | | | | | | | | |
| SC/ST | 6.30 | 5.18 | 5.55 | 3.85 | 5.53 | 6.25 | 6.20 | 4.45 |
| | (2.77) | (2.85) | (2.82) | (3.85) | (2.47) | (2.83) | (2.26) | (2.53) |
| non-SC/ST | 7.05 | 5.94 | 6.33 | 6.11 | 6.32 | 6.37 | 7.53 | 5.15 |
| | (3.33) | (2.38) | (2.91) | (3.48) | (2.62) | (2.84) | (2.39) | (2.56) |

Table 4.2
Achievement Gap Between SC/ST and Non-SC/ST Students

| State | Achievement Gap | | | | Across School Variation | | | |
|---|---|---|---|---|---|---|---|---|
| | Mathematics | | Language | | Mathematics | | Language | |
| | Unadj. | Adj. | Unadj. | Adj. | Unadj. | Adj. | Unadj. | Adj. |
| ASM | -.148* | -.073 | -.162 | -.028 | .096 | CN | .255** | CN |
| HAR | -.146** | - 112** | -.158** | -.114** | .012 | CN | .016 | CN |
| KAR | -.126** | -.090** | - 072 | -.060 | .002 | CN | .115** | .115* |
| KER | - 370** | -.234** | -.479** | - 384** | .071 | CN | .137** | .129* |
| MP | -.106** | -.061** | -.122** | -.075** | .046* | CN | .016 | CN |
| MAH | -.093* | - 076 | - 023 | .018 | .063 | CN | .061 | CN |
| ORI | -.166** | -.088 | -.196** | -.095 | .034 | CN | .009 | CN |
| TN | -.029 | -.023 | - 101 | -.087 | .008 | CN | 071* | CN |

*p <.05; ** p < .01.
CN constrained as Variance was insignificant.

Table 4.3
Achievement Gap Between SC/ST and Non-SC/ST Students
Across States (Meta Analysis)

| Subject | Coef. | (SE) | Variance |
|---|---|---|---|
| Mathematics | -.086** | ( 016) | .0005 |
| Language | -.101* | ( 041) | .011** |

* p<.05 ** p<.01

## Table 4.4
## Effect of School Level Variables on the SC/ST Gap in Languag Achievement for Karnataka and Kerala

| | Karnataka | | Kerala | |
|---|---|---|---|---|
| Factors | Coef. | (SE) | Coef. | (SE) |
| Teacher Quality | | | | |
| Tch Qual | - | - | - | - |
| Tch Exp | -.013* | (.006) | -.027 | (.015) |
| Inservice | - | - | - | - |
| Stay Period | - | - | - | - |
| Residual Variance | | | | |
| SC/ST gap | .097** | | .136** | |
| School Resources | | | | |
| Material | - | - | -.059 | (.034) |
| Ednl Facil | - | - | - | - |
| Phy Facil | .030 | (.020) | - | - |
| No Tchr | - 033 | (.022) | - | - |
| P-T Ratio | -.005 | (.003) | -.048 | (.039) |
| Primary | .154 | (.117) | - | - |
| Pct FmTch | -.003 | (.003) | 004 | (.003) |
| Residual Variance | | | | |
| SC/ST gap | .100** | | .134** | |
| School Academic Climate | | | | |
| Read & dictn | - | - | -.685 | ( 384) |
| Test & fdback | - | - | .418** | ( 124) |
| Tch give HW | - | - | - | - |
| Ppl do HW | - | - | - | - |
| Tch commit | - | - | - | - |
| Prnt Invl | .134* | (.055) | -.261 | (.150) |
| Ht leader | - | - | - | - |
| Residual variance | | | | |
| SC/ST gap | .097** | | 087* | |

* p< .05; ** p <.01

**Figure 4.1**

**Percentage of SC/ST Students**

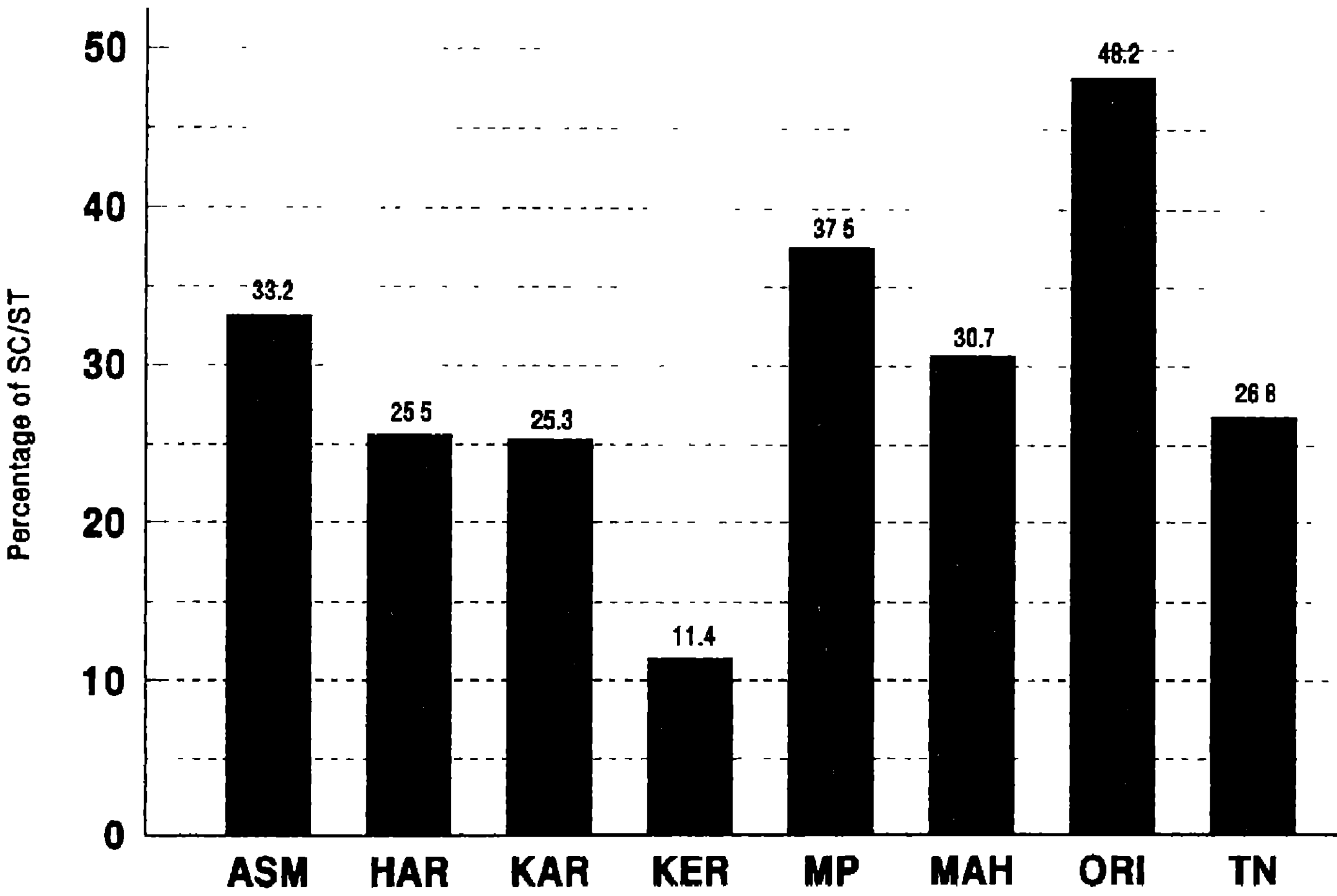
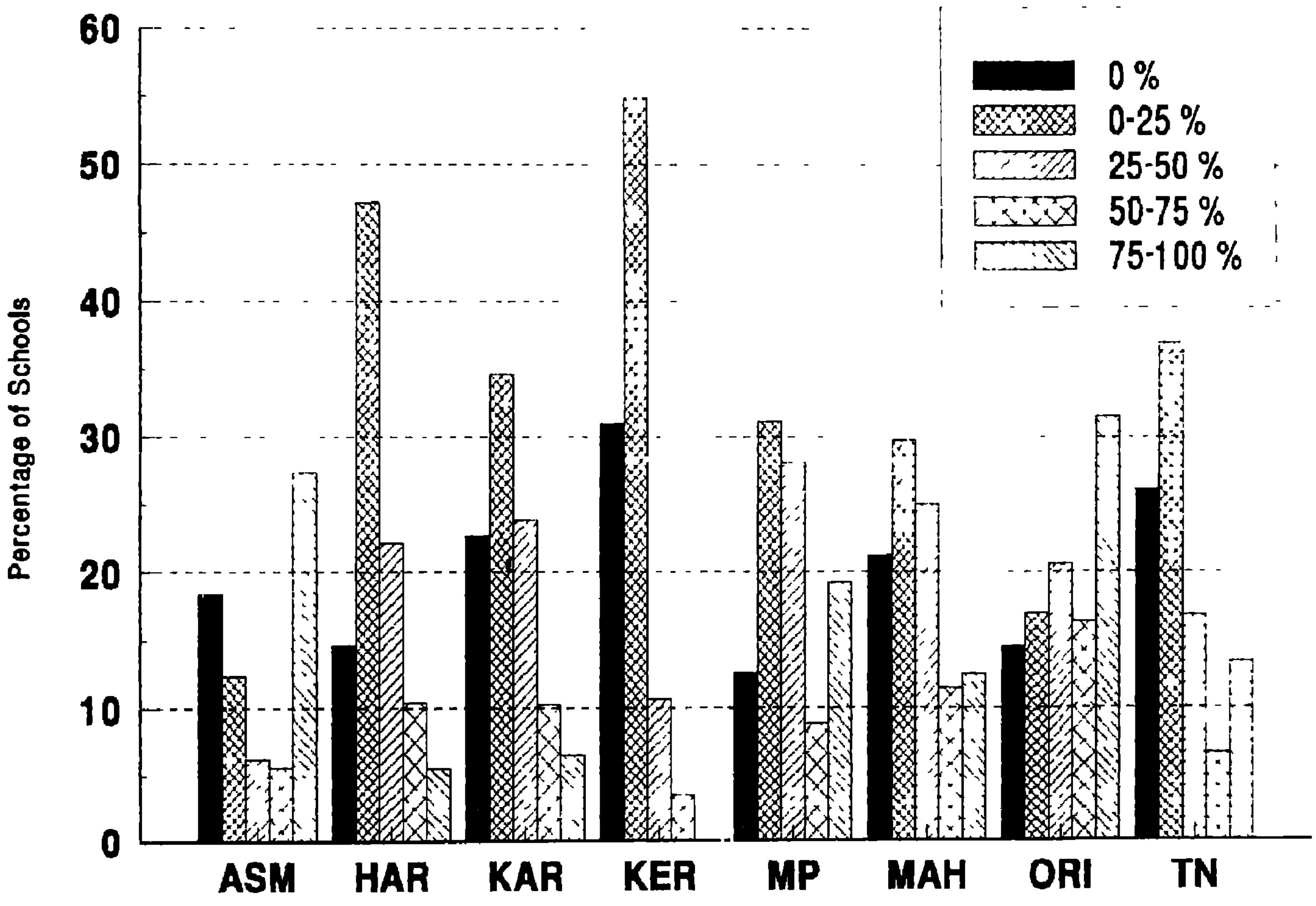


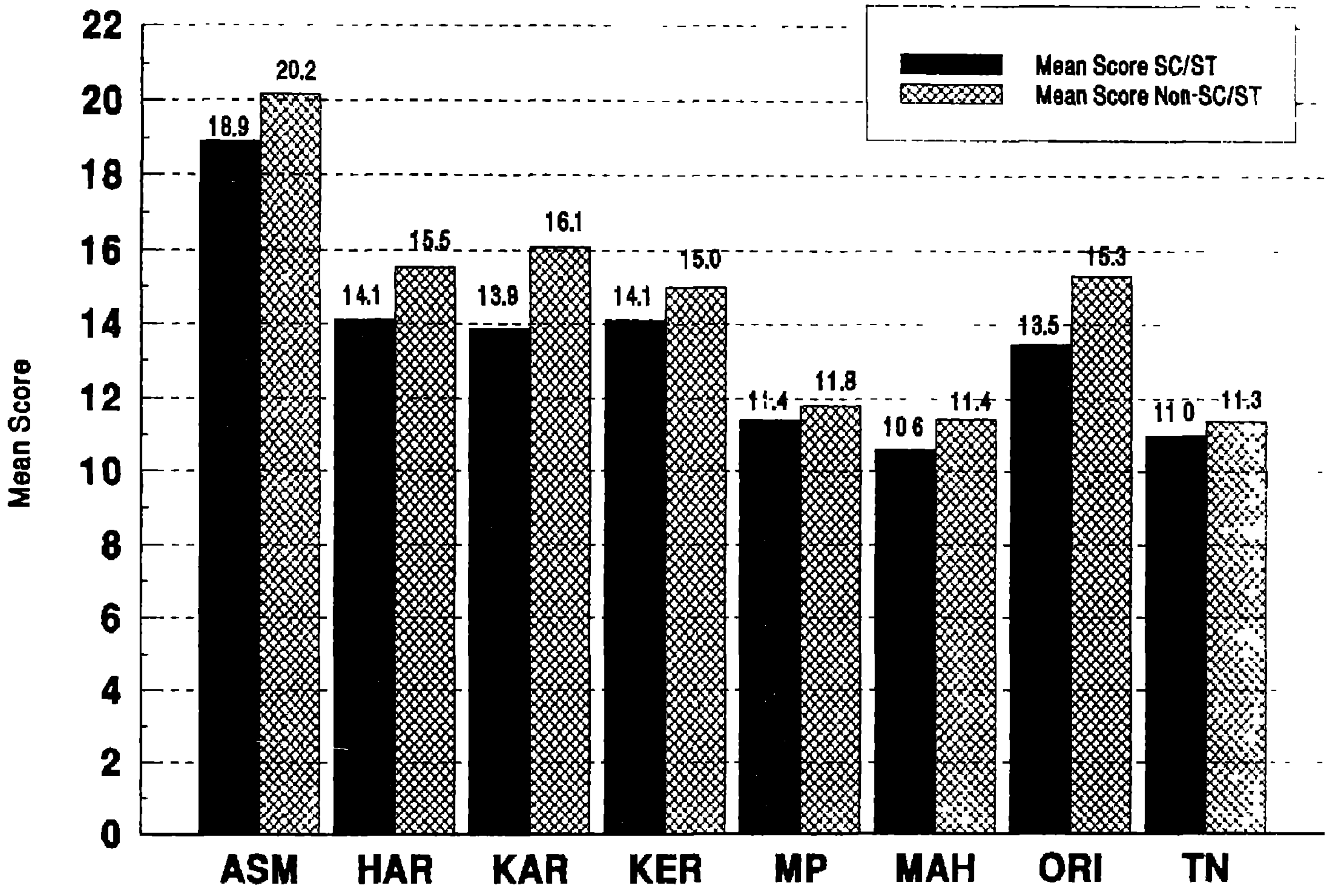
**Figure 4.2**

**Percentage of Schools at Different Level of Concentration of SC/ST Students**



## Figure 4.3

## Mean Scores of SC/ST and Non-SC/ST Students on Mathematics Achievement



## Figure 4.4

## Mean Scores of SC/ST and Non-SC/ST Students on Language Achievement

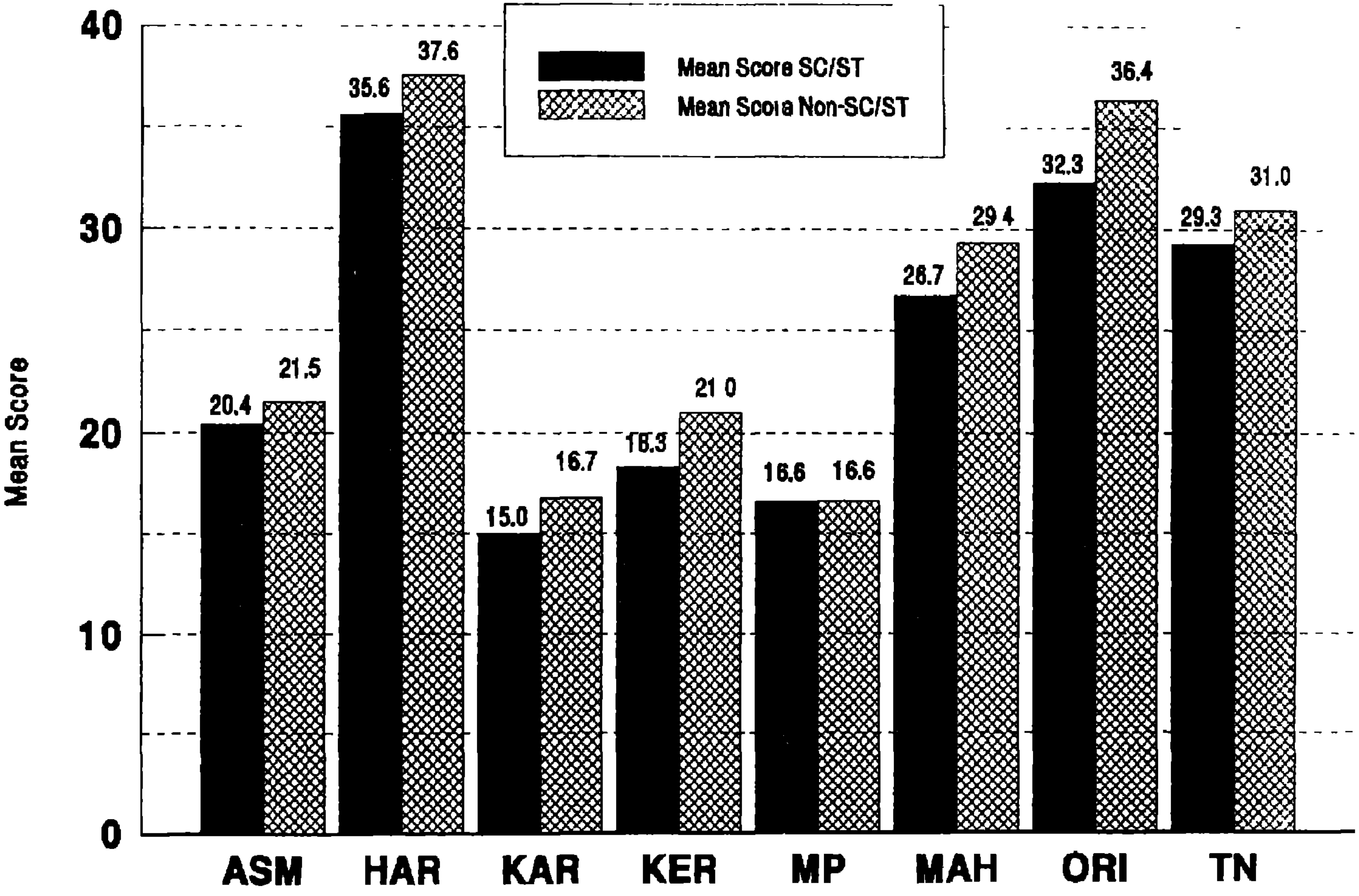
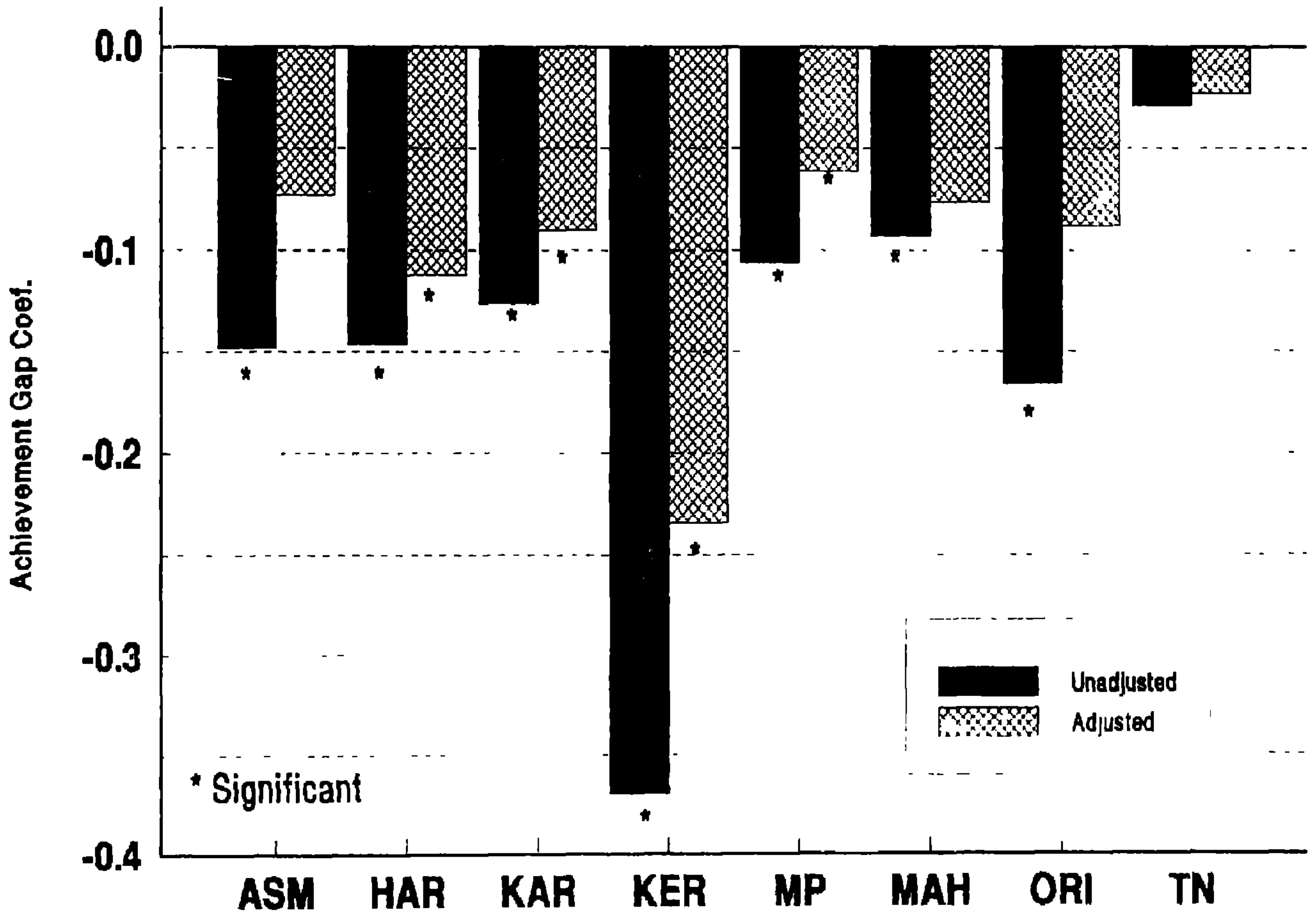


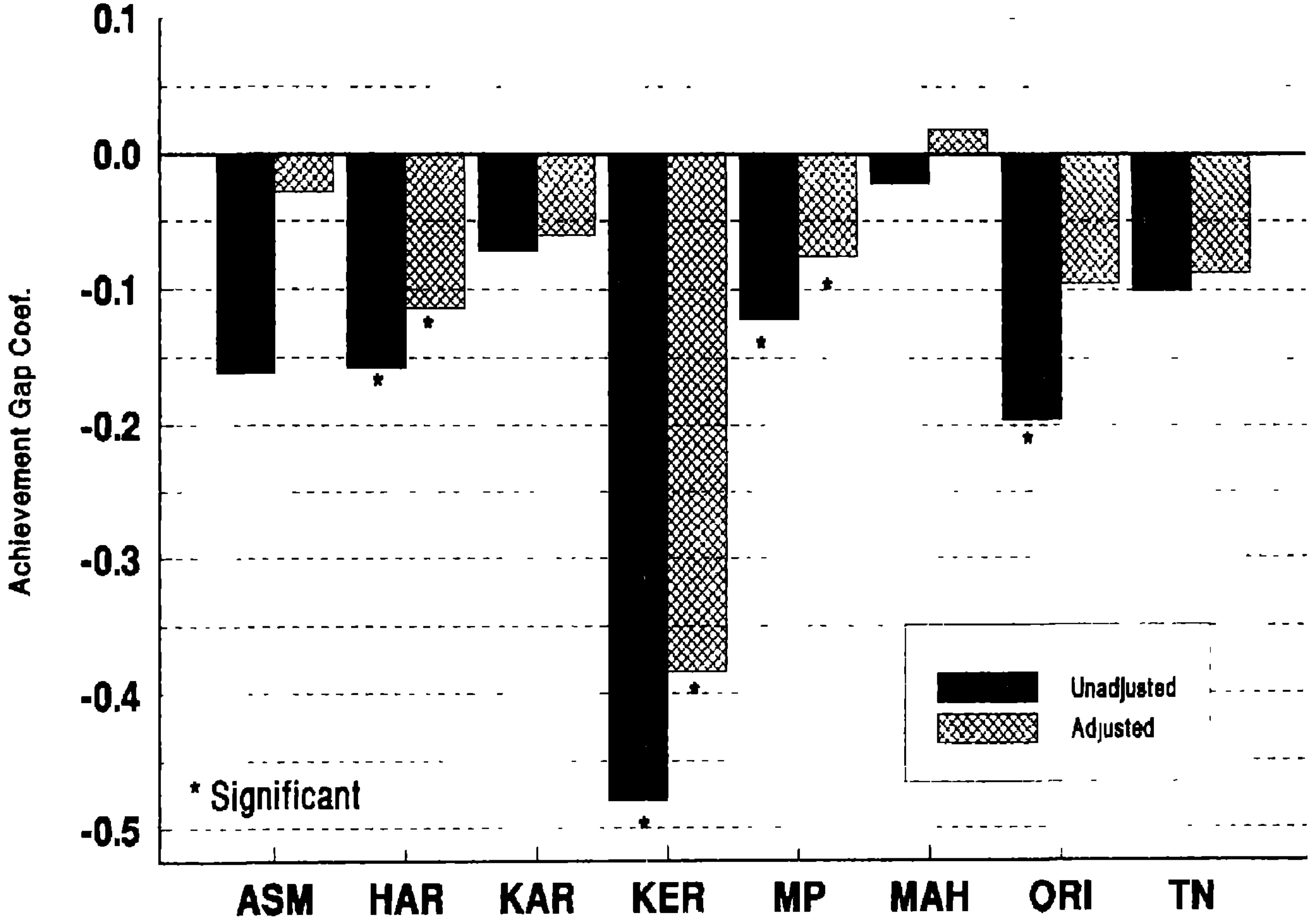
Figure 4.5

Unadjusted and Adjusted Achievement Difference In Mathematics Between SC/ST and Non-SC/ST



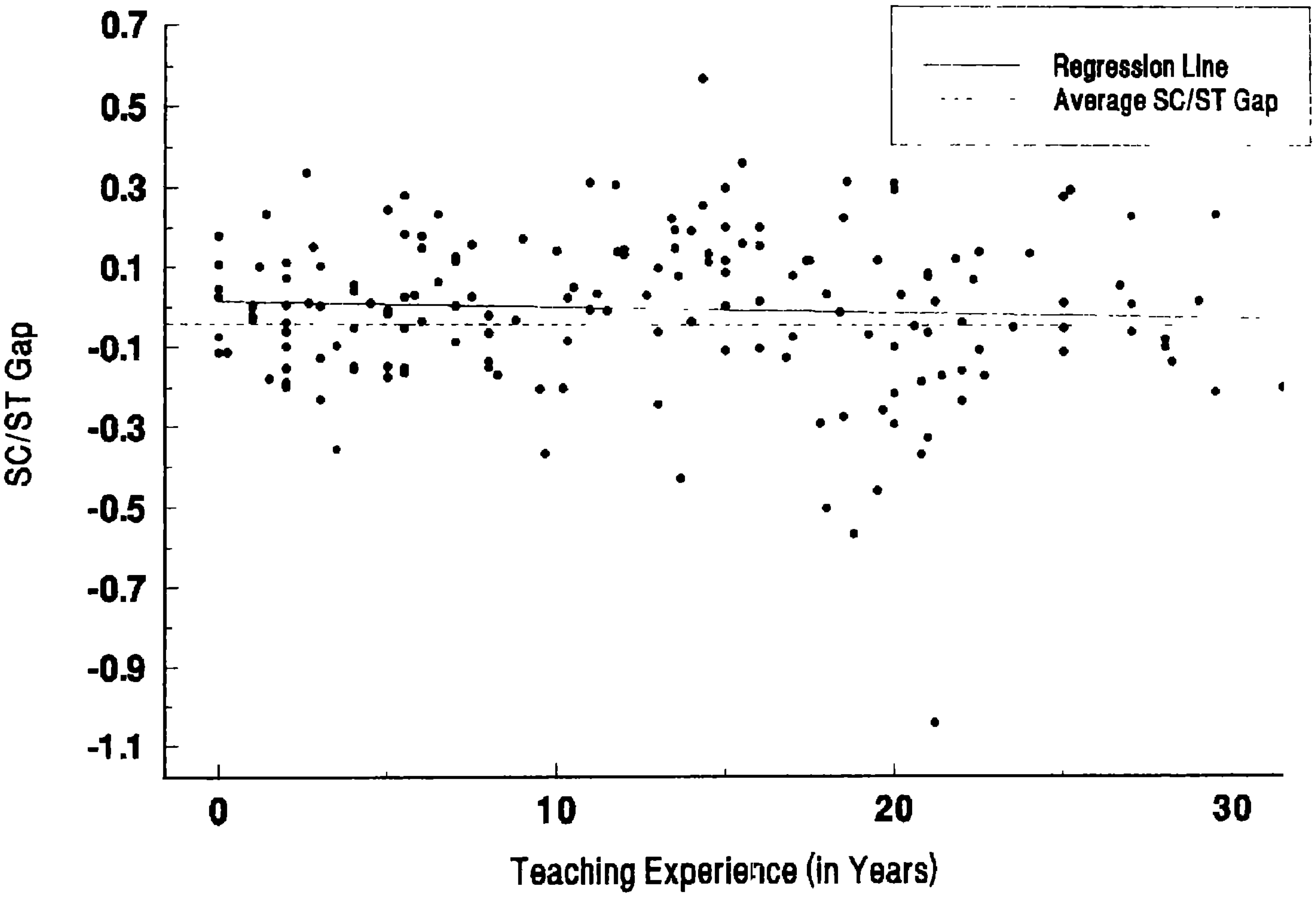
## Figure 4.6

## Unadjusted and Adjusted Achievement Difference in Language Between SC/ST and Non-SC/ST



## Figure 4.7

## Effect of Teaching Experience on SC/ST Achievement Gap in Karnataka (Language)



## CHAPTER 5

## IMPACT OF STATE INTERVENTIONS ON PUPIL'S ACHIEVEMENT

### Introduction

The NPE-86, recognising the unattractive school environment at the elementary stage of education, specified that "provision will be made of essential facilities in primary schools." Accordingly, the government of India formulated the Operation Blackboard (OB) scheme to make primary schools more attractive. Under this scheme, provision was made to provide two reasonably large rooms usable in all weather conditions, at least one more teacher to a single teacher school, toys and games material, blackboards and other learning material. The OB scheme is one of the state interventions to make the primary school attractive for increasing the enrolment and retention of children in school. Whether the OB scheme has any impact on learner's achievement is the one important question attempted in this chapter. The second important question attempted is, whether this scheme helps in reducing the achievement gap between boys and girls.

Besides the provision of above mentioned essential schooling facilities, NPE-86, specified several measures for achieving equality of educational opportunity for the disadvantaged class of the society. One of the important measures was to strengthen the existing incentive schemes in the form of scholarships, free uniforms, free textbooks, mid-day meals, etc These incentive schemes were already in operation

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This chapter was written by J. K. Gupta and M. K. Gupta.

with the specific purpose to increase the enrolment and retention of children of disadvantaged group at the elementary stage of schooling. Are all these incentive schemes helping in improving the achievement of the disadvantaged group? If so, which are those schemes helping in reducing the achievement gap between advantaged and disadvantaged groups? These questions have been attempted independently in this chapter

The discussion on the impact of OB scheme and incentive schemes on mathematics and language achievement in the eight states under DPEP is taken up separately . The impact of OB scheme is presented, to begin with, by simply comparing the two types of schools, viz., OB schools (schools covered under OB scheme) and non-OB schools (schools not covered under OB scheme) by average number of OB material items and mean achievement in mathematics and language The contribution of OB scheme is estimated for both the subjects for each state after adjusting for the effects of pupil's background and the school composition factors. This is followed by the presentation of the synthesized results of all the eight states. Further, the contribution of the OB material after adjustment for the OB scheme is discussed. Subsequently, the contribution of the OB scheme in reducing gender achievement gap in both the subjects is also studied. It is attempted in view of substantial variation in the gender achievement gap across schools within each state.

The discussion on the contribution of incentive schemes is separately taken up by adjusting the contribution of pupil's background and school composition factors for both the subjects

in each of the eight states. This covers three different aspects, viz., contribution of each incentive scheme in enhancing pupils achievement, in bridging the achievement gap between boys and girls, and in reducing differences between SC/ST and non-SC/ST students in terms of their achievement. In the end of the chapter, the summary of findings is reported.

**Impact of OB Scheme on School Mean Achievement**

While examining the impact of OB scheme on learning achievement it should be kept in mind that this scheme was introduced in 1987-88 for those schools which did not have bare minimum basic facilities. Hence, their mean achievement level at the time of introducing the scheme is likely to be far below than that of non-OB schools.

The provision under the OB scheme, in addition to two reasonably large rooms and at least one more teacher to a single teacher school, specified a number of items including toys and games material, blackboard and learning material. The list of such items (OB material) included in the study is given in Table 7.2 of Chapter 7. Table 5.1 presents the basic characteristics of the OB and non-OB schools in terms of availability of average number of OB items, achievement means and standard deviations in mathematics and language.

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insert Table 5.1 here about

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The preliminary analysis indicates that average of OB material available in OB schools is higher than that in non-OB schools for all the states. The results clearly show that the

mean achievement of OB schools is distinctly higher than that of non-OB schools in the states of Assam and Madhya Pradesh in both mathematics and language In Kerala, the mean achievement of OB schools is distinctly higher in mathematics only. In Maharashtra, however, the mean performance of non-OB schools is higher and perceptible than that of OB schools in both the subjects. Further, there is no discernible difference between the mean achievement of OB and non-OB schools in the remaining states.

The estimates of effect of OB scheme on mathematics and language achievement after partialling out the effects of pupil background and school intake composition variables are presented in Table 5.2. The results indicate that there is a distinct gap in the performance of OB and non-OB schools on both mathematics and language achievement in Madhya pradesh. Whereas such gap also exists in Assam for language and in Kerala for mathematics. In these states OB schools show better performance than non-OB schools. The results further reveal that the OB scheme improves the mean performance of schools on mathematics achievement in Kerala and Madhya Pradesh by about 23 and 13 per cent of their respective standard deviations. Whereas, the scheme enhances the language mean achievement by about 26 per cent of a standard deviation in Assam and by 22 per cent of a standard deviation in Madhya Pradesh. It indicates that the OB scheme did have a discernible impact on learning achievement in these states. In the remaining states there is no evidence of OB scheme having any definite impact on pupils achievement in both the subjects.

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insert Table 5.2 here about
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As discussed in the preceding section, the raw mean scores on both mathematics and language achievement in Maharashtra were distinctly higher in non-OB schools than in OB schools. But the achievement gap between OB and non-OB schools in both the subjects is indiscernible after partialling out the effects of pupil's background and school context variables.

The above discussions indicate overall contribution of OB scheme in individual states. In each state, there are some OB schools performing better than non-OB schools and vice-versa. In order to examine this phenomenon, the adjusted school means of OB and non-OB schools are depicted graphically. For this purpose two states, viz., Kerala showing positive impact and Maharashtra not indicating positive impact, are chosen.

Figure 5.1, indicating distribution of adjusted school means in mathematics for Kerala, depicts higher concentration of OB schools above the state mean as compared to non-OB schools. However, there are a few OB schools that performed much below the state average.

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insert Figure 5.1 here about
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Figure 5.2 shows the distribution of adjusted school means on language achievement in Kerala. It also indicates an upward trend in the regression line as in the case of mathematics achievement but now the slop is less steep. Here also a larger

proportion of OB schools is concentrated above the state mean as compared to non-OB schools although the effect of OB schools is found to be indiscernible. It may be due to a few OB schools which performed much below the state average.

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insert Figure 5.2 here about
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For Maharashtra, Figures 5.3 and 5.4 show downward regression lines indicating low performance of OB schools than that of non-OB schools on both mathematics and language achievement respectively. The figures clearly indicate that the performance of a few non-OB schools is much above the state average whereas a few OB schools have performed much below the average. Probably, the impact of OB scheme on achievement in Maharashtra is not visible due to these few schools

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insert Figure 5.3 and Figure 5.4 here about
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To study the impact of OB scheme across states, the results of all the eight states have been synthesized by using meta-analysis. The results are given in Table 5.3.

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insert Table 5.3 here about
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The size of average achievement gap between OB and non-OB schools in mathematics and language among states provide enough evidence that the OB schools perform better than non-OB schools across the states. On average, OB scheme helps in enhancing state mean achievement by nearly 10 per cent of a standard deviation on both the subjects. It further indicates that while

there is no discernible variation among the states on average achievement gap in mathematics between OB and non-OB schools, there is a distinct variation among the states on language achievement gap.

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insert Table 5.4 here about
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The estimated effect of material available under OB scheme (OB material) on pupil's achievement is given in Table 5.4. It is observed that the effect of OB material is positive and discernible on mathematics achievement in Karnataka and Madhya Pradesh and on language achievement in Haryana and Madhya Pradesh; although the effect of OB scheme in Haryana and Karnataka is not perceptible. The impact of OB material on pupil's achievement in Haryana (for language) is depicted graphically in Figure 5.5. In Maharashtra, the OB material is negatively associated with the school mean achievement in both the subjects. It may be because about 33 per cent schools, having higher grades in addition to primary stage, are better equipped than the primary schools.

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insert Figure 5.5 here about
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It is interesting to note that while estimating the effect of OB material together with OB scheme, the effect size of OB scheme becomes small and indiscernible in Madhya Pradesh when actually it was highly discernible before. It indicates that the most important aspect is the number of instructional and games/play items in the schools. The number of items in all schools (OB or non-OB schools) is responsible for enhancing

pupils achievement. This is actually an indication of the efficacy of items in general. In Haryana and Karnataka where the effect size of OB scheme was negligible, the effect of OB material is discernible. For one additional item under OB scheme the mean mathematics achievement is likely to increase by about 3 to 4 per cent of their respective standard deviations in Haryana, Karnataka and Madhya Pradesh. The increase on language achievement is about 2 to 3 per cent of respective standard deviations for each additional item in these states.

**Impact of OB Scheme on Gender Achievement Gap**

The estimates of effect of OB scheme on the gap between boys and girls achievement for mathematics and language are given in Table 5.5. The impact of OB scheme on reducing the gender achievement gap is discernible in Madhya Pradesh for language only. Whereas, in Orissa, the OB scheme tends to increase the gender achievement gap in language. It may be, perhaps, due to the fact that the OB material is not effectively used. In the remaining states no such impact is observed in either language or mathematics

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insert Table 5.5 here about

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**Impact of Incentive Schemes**

The impact of incentive schemes, namely, mid-day meals, free uniform, free textbooks, attendance and other scholarships have been studied by estimating the contribution of these schemes on school means of mathematics and language achievement after

partialling out the effects of pupil's background and school context variables. The results of the analysis are presented in Table 5.6. It is observed that the contribution of free uniforms and other scholarships to the mean achievement is not discernible for both the subjects in all the eight states. The contribution of the remaining incentive schemes to the mathematics and language achievement is visible in one or two states which is discussed as follows.

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insert Table 5.6 here about
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**Mid-Day Meals** : The mid-day meals has discernible positive impact on language achievement in Madhya Pradesh. Increase in beneficiaries by one per cent results into an increase of 0.2 per cent of a standard deviation in the performance of pupils on language achievement. In other states, the scheme has not shown any impact on both language and mathematics achievement. It may be mentioned that the mid-day meals scheme is not available in the sampled schools of Assam and Haryana.

**Free Textbooks** : Supply of free textbooks to students has a positive and perceptible impact on both mathematics and language achievement in Madhya Pradesh whereas none of the remaining states has shown impact of the scheme. Increase in number of beneficiaries in Madhya Pradesh by one per cent enhances the school mean achievement for both mathematics and language by 0.3 per cent of their respective standard deviations. The effect of free textbooks on pupil's achievement in mathematics for the state of Madhya Pradesh has also been shown graphically in Figure

5.6. This indicates that the school mean achievement tends to increase as the percentage of beneficiaries increases.

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insert Figure 5.6 here about

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**Attendance Scholarship** : Provision of scholarship for regular attendance in schools has a positive and definite impact on both mathematics and language achievement in Kerala and only on language achievement in Assam. The school mean achievement would increase by 0.8 per cent of their respective standard deviations in Kerala and 5.1 per cent of a standard deviation in Assam with one per cent increase in the number of beneficiaries. No impact of this scheme is visible in the remaining states. Figure 5.7 depicts the effect of attendance scholarship on pupil's language achievement in Kerala This scheme is in operation in 29 out of 113 sampled schools in Kerala. The graph clearly indicates a positive association between percentage of beneficiaries and school mean achievement.

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insert Figure 5 7 here about

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### Impact of Incentive Schemes on Gender Achievement Gap

The estimated effect sizes of incentive schemes on gender achievement gap are given in Table 5.7. It is observed that among various incentive schemes, mid-day meals has positive and discernible impact on gender achievement gap for both mathematics and language in Madhya Pradesh. This is displayed graphically in Figure 5.8 for mathematics. It clearly indicates that as the percentage of mid-day meals beneficiaries increases

the achievement gap between boys and girls decreases.

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insert Table 5.7 and Figure 5.8 here about

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Free supply of textbooks to students reduces the achievement gap in mathematics for Orissa. Figure 5.9 shows that as the number of beneficiaries increases the achievement gap between boys and girls decreases.

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insert Figure 5.9 here about

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Attendance scholarship on the other hand tends to widen the gender achievement gap in both the subjects in Assam. It is, perhaps, indicating a weak relationship because number of beneficiaries under this scheme is negligible ( 0.20 per cent).

Other scholarships have also shown reduction in achievement gap in language for Madhya Pradesh.

**Impact of Incentive Schemes on SC/ST Achievement Gap**

As discussed in the preceding chapter, the between school variation among SC/ST students is found to be random in Karnataka and Kerala only in language. Therefore, the impact of incentive schemes on SC/ST achievement gap has been studied for these two states only. Table 5.8 presents the effect sizes of incentive schemes on SC/ST achievement gap in language. It is evident from the table that none of the incentive schemes has discernible impact on SC/ST achievement gap

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insert Table 5.8 here about

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## Summary of Findings

This chapter discusses the impact of OB scheme and incentive schemes on learner's performance, gender achievement gap and SC/ST gap. The results are to be viewed with the basic premises that the OB scheme (providing the essential schooling facilities in primary schools) covers only those schools which did not have the bare minimum basic facilities. Similarly, the incentive schemes in the form of scholarships, free uniform, free textbooks, etc., are introduced to help and motivate the children belonging to disadvantaged groups of the society.

The OB scheme, in Madhya Pradesh, has shown a discernible positive impact on both mathematics and language school mean achievement. Whereas in Assam, it is on language achievement, and in Kerala on mathematics achievement only. On synthesizing the results of all the eight states, it is found that the OB scheme, on average, has helped in improving the performance of pupils by nearly 10 per cent of a standard deviation on both mathematics and language. The OB material (as per OB list) have contributed towards improving pupil's achievement in the states of Haryana, Karnataka and Madhya Pradesh.

The OB scheme is found to be effective in reducing gender achievement gap on language in the state of Madhya Pradesh.

In Madhya Pradesh, supply of free textbooks has positive impact on both mathematics and language achievement, whereas provision of mid-day meals in schools has such impact on language achievement only. Provision of scholarship for regular attendance in schools has a positive and definite impact on both mathematics

and language achievement in Kerala and only on language achievement in Assam.

The scheme of mid-day meals has helped in reducing gender achievement gap on both the subjects in Madhya Pradesh. In Orissa, free supply of textbooks has helped in bridging the achievement gap on mathematics between boys and girls. Other scholarships reduce the gender gap in language achievement in Madhya Pradesh.

## Table 5.1
## Mean and S.D. of pupils Achievement Scores

| State | School Type | No. of schools | Average OB material | Math Scores | | | Language Scores | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean | S.D. | t | Mean | S.D | t |
| ASM | OB | 74 | 10.16 | 19.93 | 5.00 | 2.13* | 21.79 | 5.13 | 2.93** |
| | Non-OB | 87 | 4.70 | 18.02 | 6.19 | | 19.60 | 4.39 | |
| HAR | OB | 109 | 15.69 | 14.91 | 3.26 | 0.90 | 36.90 | 7.20 | 0.52 |
| | Non-OB | 35 | 10.83 | 15.48 | 3.05 | | 37.65 | 8.14 | |
| KAR | OB | 88 | 12.10 | 15 21 | 6.53 | 0.30 | 16.01 | 5.74 | 0.18 |
| | Non-OB | 88 | 11.49 | 14.93 | 6 07 | | 15.86 | 5.07 | |
| KER | OB | 54 | 12.81 | 15.66 | 2.15 | 2.62** | 21.21 | 3.39 | 1.40 |
| | Non-OB | 59 | 8 39 | 14 36 | 3.00 | | 20.33 | 3.31 | |
| MP | OB | 395 | 13.66 | 11.05 | 4.06 | 2.05* | 28.76 | 10.88 | 3.43** |
| | Non-OB | 338 | 5.65 | 10.45 | 3.77 | | 26.00 | 10.86 | |
| MAH | OB | 95 | 12.60 | 10.83 | 4.67 | 2.04* | 15.43 | 5.72 | 2.24* |
| | Non-OB | 40 | 9.65 | 12.67 | 5.01 | | 17.87 | 5.92 | |
| ORI | OB | 136 | 16.09 | 13.53 | 5 47 | 0.02 | 32.87 | 8.83 | 0.66 |
| | Non-OB | 29 | 7.10 | 13.50 | 4.98 | | 34.13 | 11.40 | |
| TN | OB | 94 | 17.76 | 10.96 | 3.00 | 0.01 | 30.32 | 6 99 | 0.70 |
| | Non-OB | 24 | 7.15 | 10.97 | 2.50 | | 29.24 | 5.52 | |

* $p < .05$; ** $p < .01$

## Table 5.2
## Impact of Operation Blackboard Scheme on Pupil's Achievement

| State | Mathematics | | Language | |
|---|---|---|---|---|
| | Coef. | (SE) | Coef. | (SE) |
| ASM | .190 | (.117) | .262** | (.100) |
| HAR | -.089 | (.113) | -.091 | (.122) |
| KAR | .065 | (.125) | 109 | (.111) |
| KER | .234** | (.084) | .098 | (.071) |
| MP | .133* | (.053) | .220** | (.053) |
| MAH | -.146 | (.132) | -.174 | (.123) |
| ORI | .067 | (.145) | -.088 | (.121) |
| TN | .004 | (.151) | .060 | (.151) |

* p < .05; ** p < .01

## Table 5.3
## Achievement Gap between OB and Non-OB Schools Across States (Meta-Analysis)

| Subject | Average Achievement Gap | | Random Variance Across States |
|---|---|---|---|
| | Coef. | (SE) | |
| Mathematics | 0 091* | (.039) | 0.004 |
| Language | 0.095 | (.051) | 0.010* |

* p<.05

## Table 5.4
## Effect of OB Material on Pupil's Achievement

| State | Factor | Mathematics | | Language | |
|---|---|---|---|---|---|
| | | Coef. | (SE) | Coef. | (SE) |
| ASM | OB Scheme | .199 | (.152) | .340** | (.129) |
| | OB Material | -.002 | (.018) | -.015 | (.015) |
| HAR | OB Scheme | -.204 | (.131) | -.238 | (.140) |
| | OB Material | .026 | (.015) | .033* | (.016) |
| KAR | OB Scheme | .023 | (.124) | .085 | (.112) |
| | OB Material | .039** | (.013) | .021 | (.012) |
| KER | OB Scheme | .199* | (.099) | .067 | (.083) |
| | OB Material | .008 | (.011) | .009 | (.009) |
| MP | OB Scheme | -.068 | (.070) | .026 | (.070) |
| | OB Material | .025** | (.006) | .024** | (.006) |
| MAH | OB Scheme | -.050 | (.137) | -.087 | (.128) |
| | OB Material | -.031* | (.014) | -.026* | (.013) |
| ORI | OB Scheme | -.043 | (.209) | -.215 | (.175) |
| | OB Material | .013 | (.017) | .014 | (.015) |
| TN | OB Scheme | .237 | (.208) | .103 | (.211) |
| | OB Material | -.028 | (.016) | - 006 | (.016) |

* p < 05; ** p < .01

## Table 5.5
## Effect of OB Scheme on Gender Achievement Gap

| State | Mathematics | | Language | |
|---|---|---|---|---|
| | Coef. | (SE) | Coef. | (SE) |
| ASM | -.074 | ( 096) | -.156 | (.103) |
| HAR | -.034 | (.123) | .142 | (.114) |
| KAR | .029 | (.089) | -.033 | (.098) |
| KER | .073 | (.091) | .005 | (.078) |
| MP | .065 | (.041) | .002* | (.050) |
| MAH | .030 | (.132) | -.016 | (.127) |
| ORI | -.143 | (.131) | -.308* | (.141) |
| TN | .015 | (.124) | .004 | (.129) |

* $p<.05$

## Table 5.6
## Effect of Incentive Schemes On Pupil's Achievement

| Incentive Schemes | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Coef. (SE) | Coef. (SE) | Coef. (SE) | Coef. (SE) | Coef. (SE) | Coef. (SE) | Coef. (SE) | Coef. (SE) |
| MATHEMATICS | | | | | | | | |
| Mid-Day Meals | N.A. | N.A. | -.000 | -.001 | -.001 | -.004 | -.002 | -.004 |
| | | | (.002) | (.001) | (.001) | (.004) | (.010) | (.004) |
| Free Uniform | -.006 | .001 | -.001 | -.030 | -.001 | .002 | .004 | .002 |
| | (.004) | (.005) | (.003) | (.022) | (.001) | (.003) | (.005) | (.004) |
| Free Textbooks | .000 | -.001 | -.006 | -.003 | .003** | -.004 | -.001 | -.003 |
| | (.003) | (.003) | (.004) | (.003) | (.001) | (.003) | (.002) | (.006) |
| Attendance Scholarship | .034 | -.003 | -.000 | .008* | -.006 | .005 | -.071 | -.005 |
| | (.031) | (.003) | (.004) | (.004) | (.001) | (.006) | (.170) | (.007) |
| Other Scholarship | .025 | -.002 | .001 | .000 | .000 | .018 | -.010 | -.002 |
| | (.121) | (.003) | (.010) | (.003) | (.004) | (.024) | (.010) | (.004) |
| LANGUAGE | | | | | | | | |
| Mid-Day Meals | N.A. | N.A. | -.001 | -.001 | .002* | -.001 | .007 | -.002 |
| | | | (.002) | (.001) | (.001) | (.003) | (.009) | (.004) |
| Free Uniform | -.005 | .002 | .002 | -.024 | .001 | .001 | .002 | .000 |
| | (.003) | (.004) | (.003) | (.022) | (.001) | (.003) | (.004) | (.004) |
| Free Textbooks | .000 | -.002 | -.006* | .002 | .003** | -.001 | -.002 | -.002 |
| | (.003) | (.003) | (.003) | (.003) | (.001) | (.002) | (.002) | (.006) |
| Attendance Scholarship | .051* | -.001 | .002 | .008* | -.005 | .006 | .104 | -.002 |
| | (.026) | (.003) | (.004) | (.004) | (.001) | (.006) | (.137) | (.007) |
| Other Scholarship | -.022 | .001 | -.002 | -.000 | .004 | .006 | -.008 | -.003 |
| | (.101) | (.003) | (.009) | (.003) | (.004) | (.023) | (.009) | (.004) |

* $p < .05$; ** $p < .01$.
N.A. - Incentive scheme is not available

## Table 5.7
## Effect of Incentive Schemes on Gender Achievement Gap

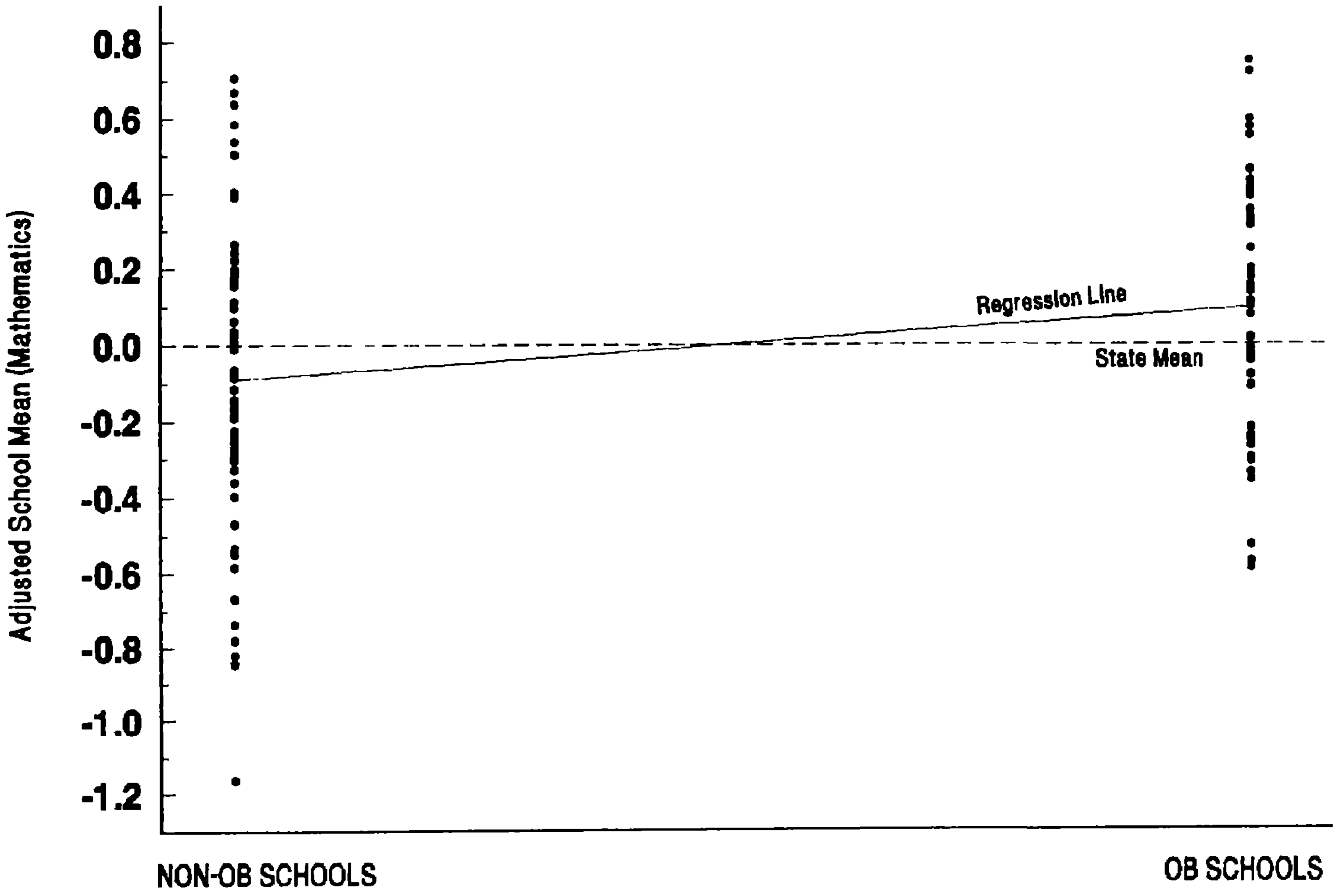
| Incentive Scheme | ASM | HAR | KAR | KER | MP | MAH | ORI | TN |
|---|---|---|---|---|---|---|---|---|
| | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) | Coef.<br>(SE) |
| MATHEMATICS | | | | | | | | |
| Mid-Day Meals | N.A. | N.A. | .003 | -.001 | .003** | -.002 | .003 | .000 |
| | | | (.002) | (.001) | (.001) | (.004) | (.014) | (.003) |
| Free Uniform | .002 | .001 | .003 | .021 | .001 | -.001 | -.002 | .002 |
| | (.003) | (.006) | (.002) | (.029) | (.002) | (.004) | (.004) | (.004) |
| Free Textbooks | 003 | .000 | -.004 | -.001 | -.001 | .001 | 004* | 001 |
| | (.003) | (.003) | (.003) | (.003) | (.001) | (.003) | (.002) | (.005) |
| Attendance Scholarship | -.040* | .004 | -.000 | -.005 | -.001 | -.000 | .043 | - 006 |
| | (.021) | (.004) | (.003) | (.004) | (.001) | (.006) | (.119) | (.006) |
| Other Scholarship | .032 | -.001 | -.002 | -.004 | .003 | .008 | .002 | .001 |
| | (.080) | (.003) | (.008) | (.004) | (.005) | (.023) | (.014) | (.003) |
| LANGUAGE | | | | | | | | |
| Mid-Day Meals | N.A. | N.A. | -.001 | .001 | .002* | -.000 | .004 | -.001 |
| | | | (.002) | (.001) | (.001) | (.003) | (.016) | (.003) |
| Free Uniform | .001 | .002 | .005 | .012 | -.001 | .002 | -.000 | .000 |
| | (.003) | (.005) | (.003) | (.025) | (.002) | (.003) | (.005) | (.004) |
| Free Textbooks | .003 | -.000 | -.006* | .002 | .000 | .003 | .003 | .000 |
| | (.003) | (.003) | (.003) | (.003) | (.001) | (.003) | (.002) | (.005) |
| Attendance Scholarship | -.064** | 004 | .004 | - 003 | .000 | -.007 | -.010 | -.003 |
| | (.021) | (.004) | (.003) | (.004) | (.001) | (.006) | (.132) | (.007) |
| Other Scholarship | .052 | 000 | 001 | 002 | .010* | -.005 | -.002 | - 003 |
| | (.085) | ( 003) | (.008) | (.003) | (.005) | (.022) | (.015) | (.003) |

* p<.05, ** p<.01.
N.A. - Incentive scheme is not available

## Table 5.8
## Effect of Incentive Schemes on SC/ST Achievement Gap in Language

| Incentive Scheme | Karnataka | | Kerala | |
|---|---|---|---|---|
| | Coef. | (SE) | Coef. | (SE) |
| Mid-Day Meals | -.003 | ( 002) | .001 | (.001) |
| Free Uniform | .002 | (.003) | .012 | (.025) |
| Free Textbooks | -.001 | (.003) | .002 | (.003) |
| Attendance Scholarship | .002 | (.003) | -.003 | (.004) |
| Other Scholarship | .001 | (.007) | -.002 | (.003) |

Figure 5.1
Effect of OB Scheme on Pupil's Achievement
In Kerala (Mathematics)



## Figure 5.2
## Effect of OB Scheme on Pupil's Achievement in Kerala (Language)

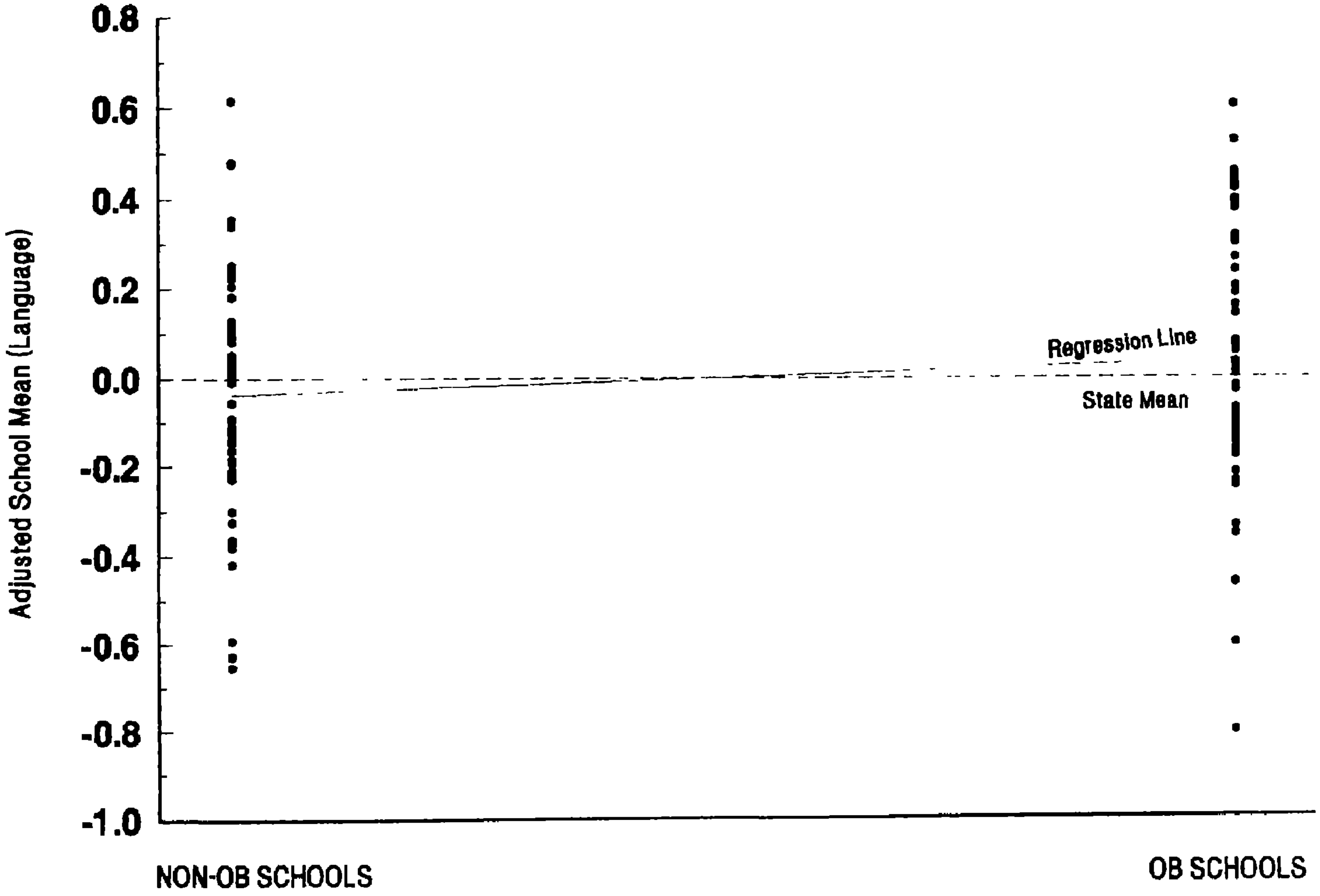
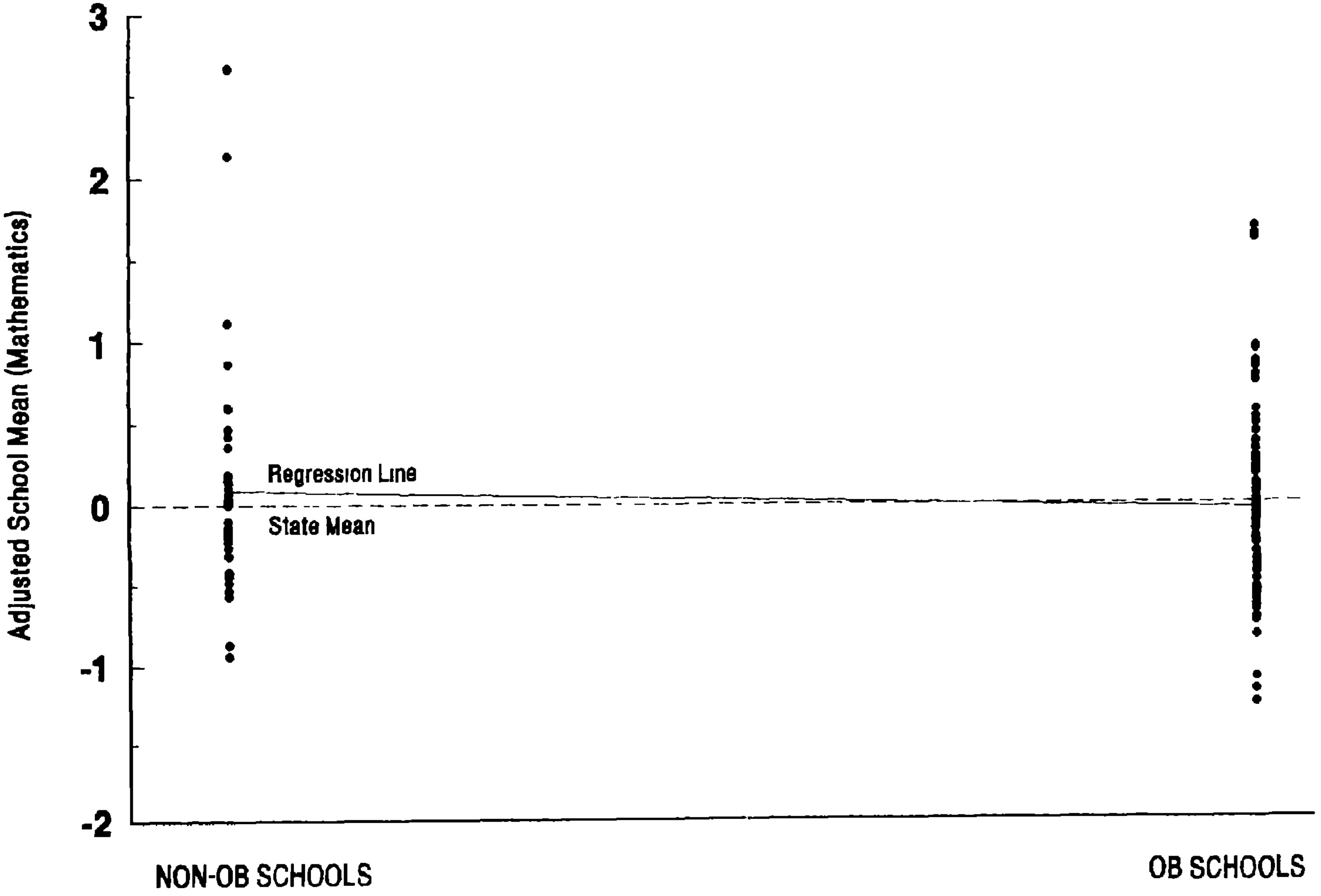
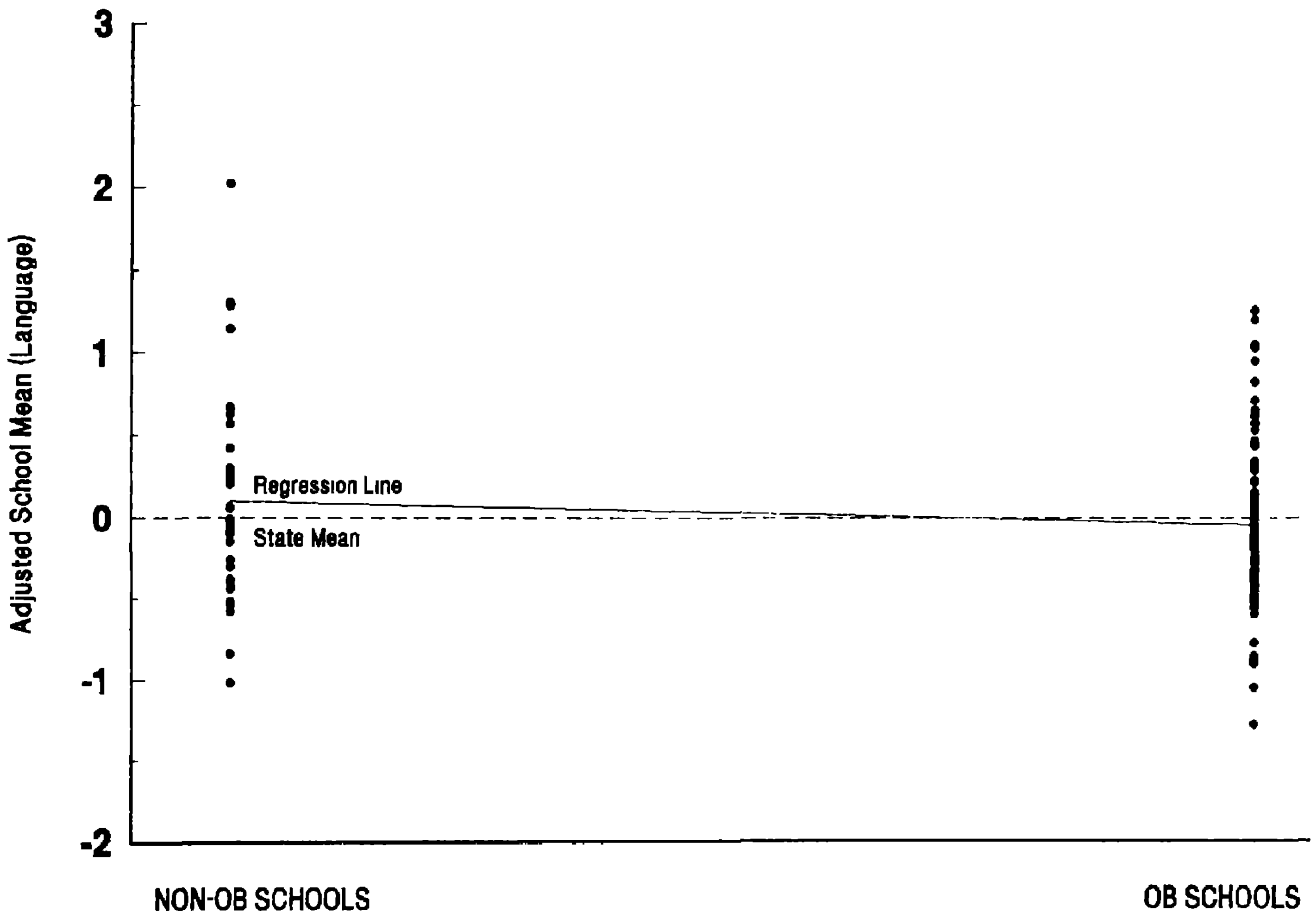


Figure 5.3
Effect of OB Scheme on Pupil's Achievement in Maharashtra (Mathematics)

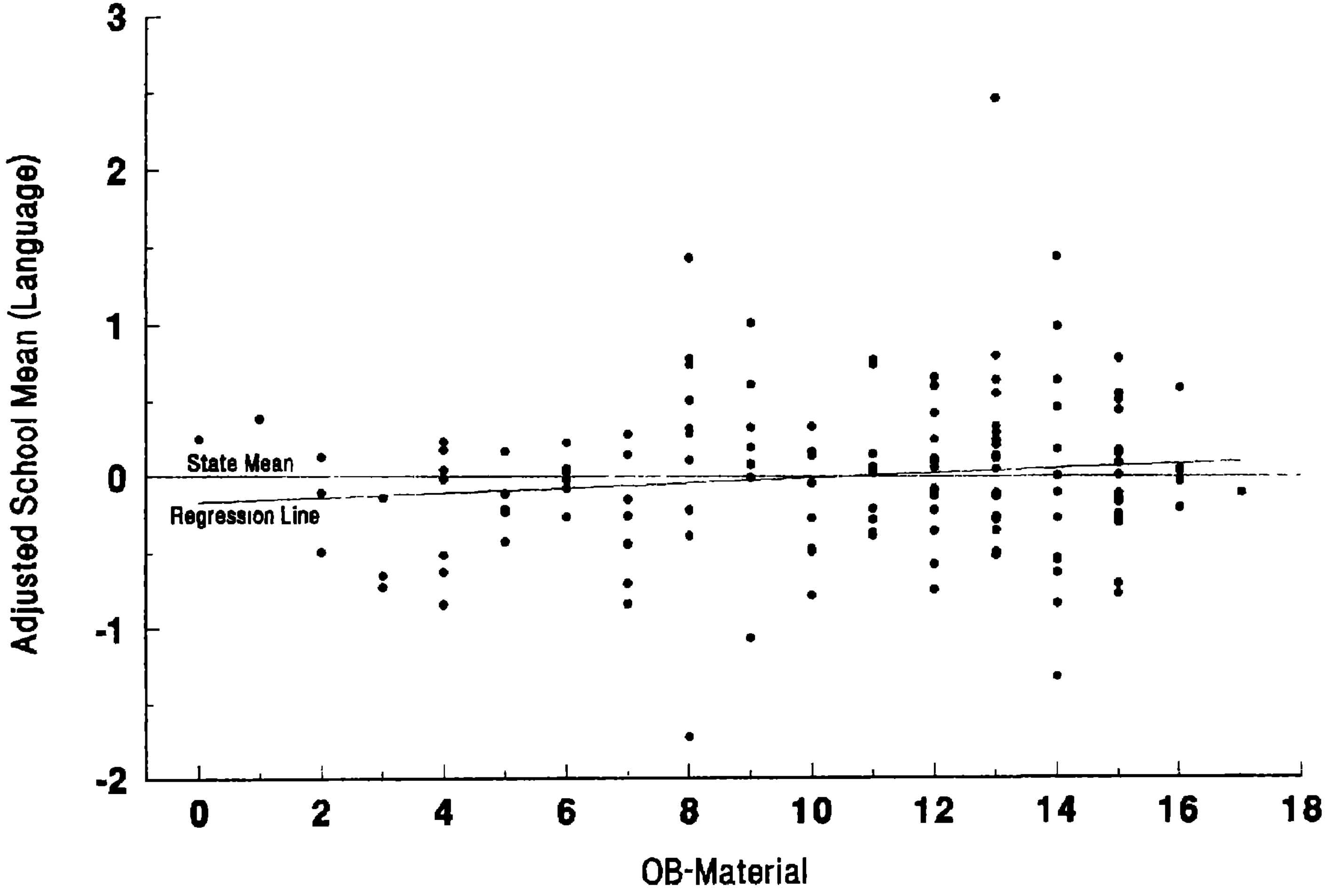


## Figure 5.4
## Effect of OB Scheme on Pupil's Achievement in Maharashtra (Language)



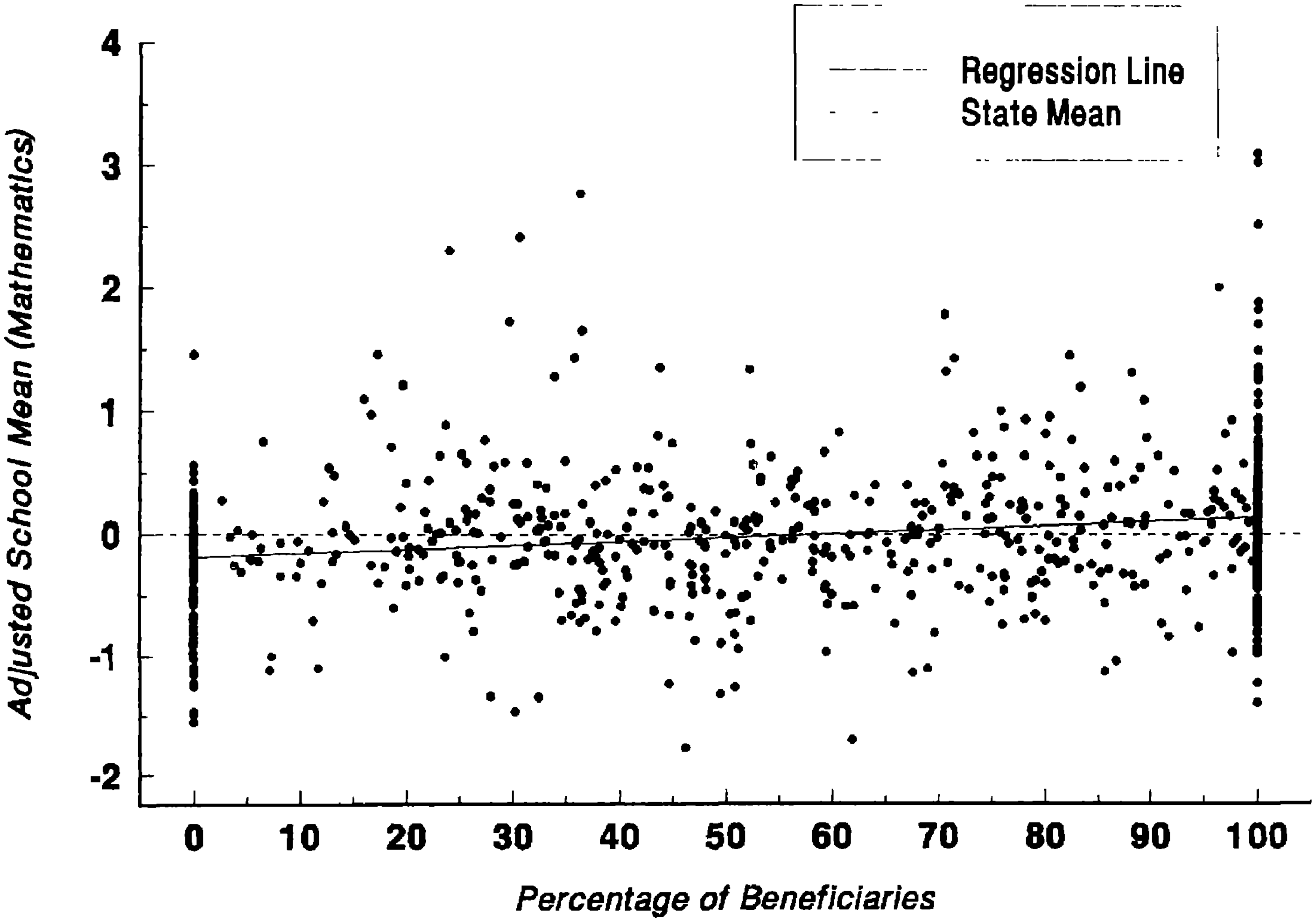
## Figure 5.5

## Effect of OB-Material on Pupil's Achievement in Haryana (Language)



## Figure 5.6

## Effect of Free Supply of Text Books on Pupil's Achievement in Madhya Pradesh (Mathematics)



# Figure 5.7
## Effect of Attendance Scholarship on Pupil's Achievement
## In Kerala (Language)

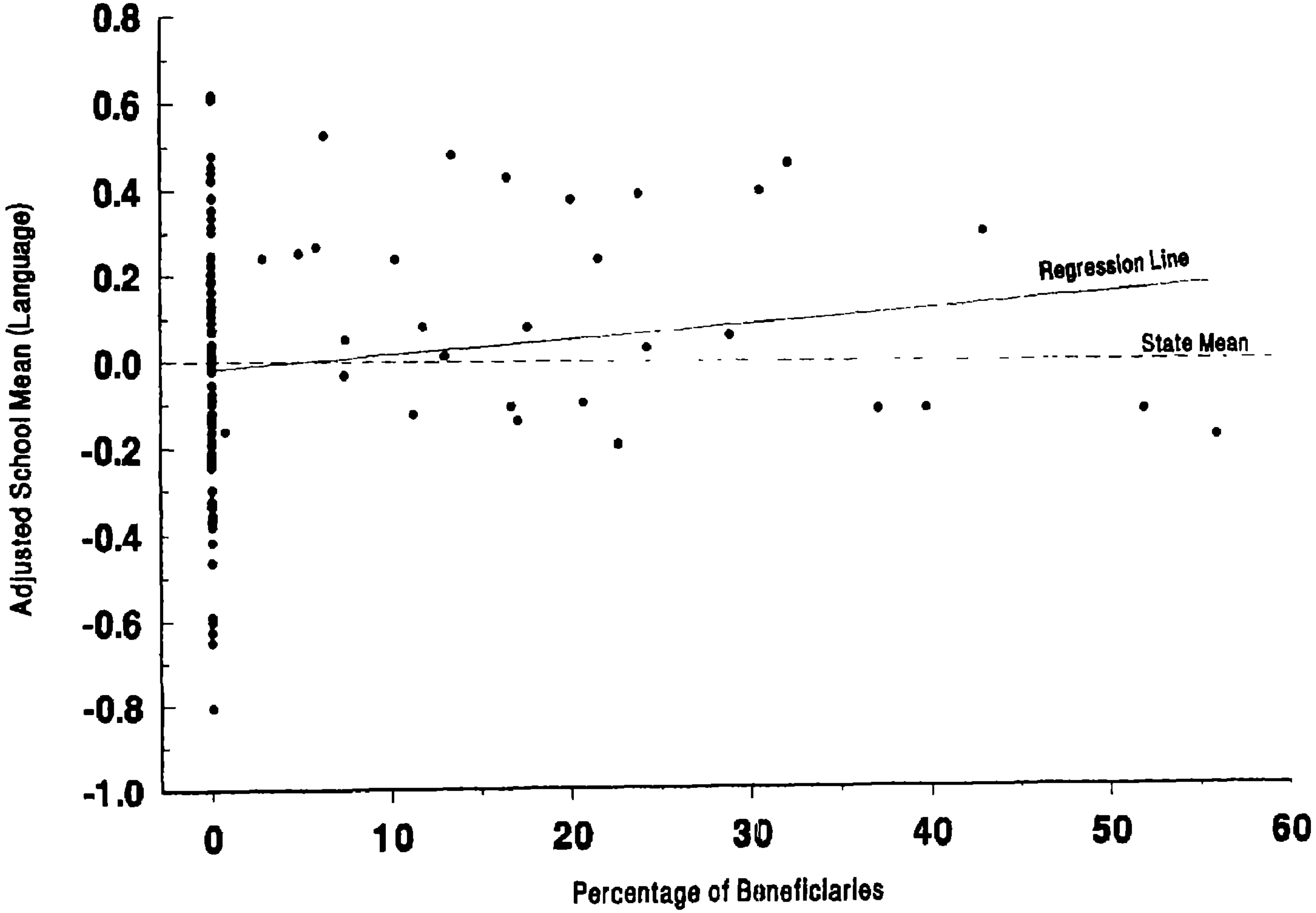
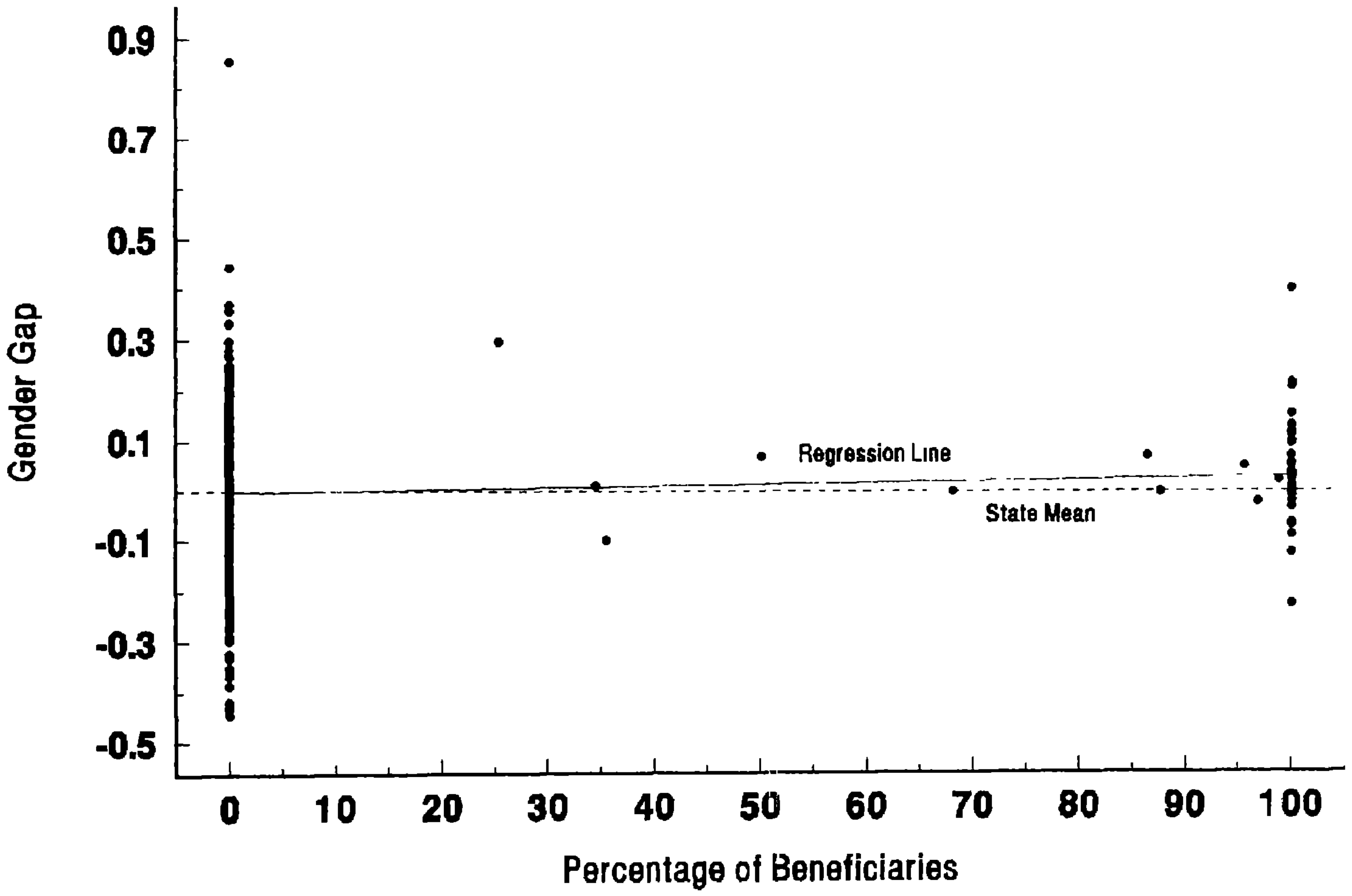


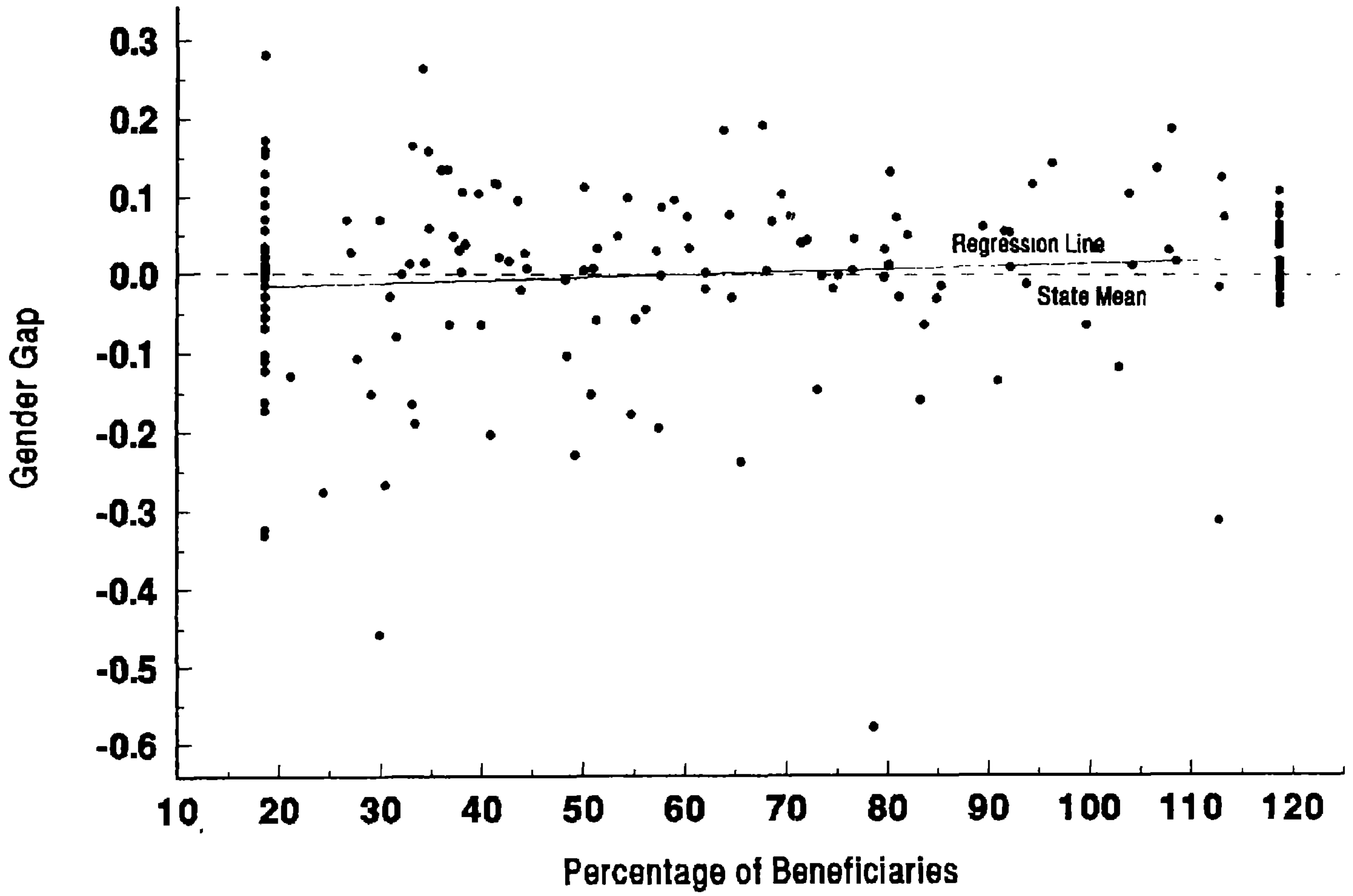
**Figure 5.8**

**Effect of Mid-Day Meals on Gender Achievement Gap
In Madhya Pradesh (Mathematics)**



## Figure 5.9

## Effect of Free Supply of Textbooks on Gender Achievement Gap in Orissa (Mathematics)



# CHAPTER 6

# FINDINGS AND IMPLICATIONS

## An Overview

To realise the goal of Universalisation of Elementary Education several initiatives have been taken up at various levels. The one such recent initiative, the District Primary Education Programme is to develop and implement in selected educationally backward districts, a replicable, sustainable and cost effective programme to increase enrolment, to reduce drop-out and to improve the level of achievement at the primary stage. The programme is being implemented in 44 districts of eight selected states, namely, Assam, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu. As a part of the project formulation process. six baseline beneficiary studies were undertaken in 1993. In the present study the data of one of the beneficiary studies titled "Learning Achievement of Primary School Children in Reading and Mathematics" have been used. In all 1,746 schools, 4,879 teachers and 23,700 students (grade IV/V) from 43 districts (out of 44) are covered in this study.

The aim of the present study is to identify the factors which are possibly responsible for bringing about the qualitative improvement in terms of pupil's achievement in mathematics and language at the primary stage of education. These factors could be the basis for planning the district level

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This chapter was written by J.K. Gupta and R.R. Saxena.

intervention programmes. With this background the specific objectives are to study

(i) the effects of school policies and practices on learner's achievement;

(ii) the achievement differences between boys and girls in relation to school level variables;

(iii) the effects of school policies and practices on achievement gap between SC/ST and non-SC/ST; and

(iv) the impact of state interventions on learner's achievement.

The analysis has been undertaken by using the multilevel linear regression model with hierarchical structure of data at two levels, viz., pupil and school. To begin with the effects of pupil background and school context variables are estimated. Thereafter, the effects of these variables are partialled out in order to obtain precise estimates of the contribution of variables pertaining to school policies and practices.

Of the 35 indicators developed, 7 are at the pupil level and 28 at the school level. The school level indicators have been classified into five groups known as "construct". These are: school context(2); teacher quality(4); school resources(7); school academic climate(8); and state interventions(7). The list of indicators is as under.

Pupil's Level Variables - gender, SC/ST, father's education, mother's education, father's occupation, and repeater.

School Context - Mean SES and Per cent SC/ST.

Teacher Quality - teacher qualification, teaching experience, inservice training, and period of stay in the present school.

School Resources - access of teaching material to teachers, availability of educational facility in the school, physical facility, number of teachers, pupil-teacher ratio, category of school (primary/extended primary), and percentage of female teachers.

School Academic Climate - teacher giving arithmetic problem to solve in the class, teacher asking to read aloud and give dictation in the class, teacher frequently giving tests and providing feedback, teacher regularly assigning homework and correcting it, time devoted to homework by student, teacher commitment, parent involvement, and head teacher as leader.

State Intervention Variables - Operation Blackboard Scheme, Material under OB Scheme, Mid-day Meals, Free Uniform, Free Textbooks, Scholarship for Regular Attendance, and Other Scholarship.

**Effect of Student's Background on Achievement**

The pupil's achievement in mathematics and language vary substantially within as well as between schools in all the eight states. The between school variance is mostly lower in language achievement than in mathematics across states.

Performance of girls, on average, is lower than that of boys in all the states except the state of Kerala. Further, the performance difference between boys and girls vary across schools. SC/ST students have performed lower than non-SC/ST students in the states of Haryana, Karnataka, Kerala, Madhya Pradesh and Maharashtra. Whereas there is no such difference in Assam, Orissa and Tamil Nadu. These differences in achievement are within schools only. They do not vary across schools in all the states except in Karnataka and Kerala for language Parents' (father/mother) education and father's occupation are found to be positively associated with pupil's achievement and are mostly consistent across states. Repeaters' performance is found to be

relatively low as compared to those pupils who did not repeat in any grade(s). These differences are confined to within schools.

### Effect of School Context on Achievement

Among the school context variables, mean SES has shown a positive association with school mean achievement in mathematics for Kerala, Madhya Pradesh, Maharashtra and Orissa, and in language for Karnataka, Kerala, Madhya Pradesh and Maharashtra. Whereas the variable, per cent SC/ST, has witnessed such an association only in mathematics for Kerala.

### Effect of School Factors on Achievement

Under the construct of teacher quality, the factor of teacher qualification is positively associated with the school mean achievement in mathematics for Assam, and in language for Assam and Tamil Nadu. The factor, teaching experience is negatively associated with school mean achievement in both the subjects for the state of Kerala only. It indicates that longer the teaching experience lower is the school mean achievement. On further examination, it is found that the school mean achievement increases with the increase in number of years of experience up to 10 years only and thereafter the mean achievement starts decreasing. The factor, duration of stay of a teacher in the present school, has indicated a positive association with the school mean achievement in mathematics for Madhya Pradesh, and in language for Tamil Nadu.

In school resources, two factors, viz., educational facilities and physical facilities in schools have a positive

association with school mean achievement in mathematics. The former has shown its contribution for mathematics in Kerala and Madhya Pradesh, and for language in Madhya Pradesh only. Whereas the latter has contributed for both the subjects in the states of Karnataka, Madhya Pradesh and Orissa.

Another factor of school resources,viz., pupil-teacher ratio has shown negative association with the school mean achievement in both the subjects for the state of Madhya Pradesh. It indicates that as the pupil-teacher ratio increases the school mean achievement decreases. On exploration it is found that the school mean achievement continue decreasing and gradually reaches below the state mean as the pupil-teacher ratio exceeds 50. This shows that a student does not recieve due attention of the teacher in a crowded class.

Under the school academic climate, all the eight factors are contributing to pupil's achievement either in mathematics or language or both. Of these, three factors, viz., teacher frequently taking test and providing feedback, teacher assigning and correcting homework, and time devoted by pupil for doing the homework have positive association with the school mean achievement in both mathematics and language. The first factor enhances the school mean achievement in mathematics for Karnataka, Kerala and Madhya Pradesh, and in language for Karnataka and Madhya Pradesh. The second factor contributes positively in mathematics for Maharashtra, Orissa and Tamil Nadu, and in language for Assam, Madhya Pradesh, Maharashtra and Orissa. The third factor increases the mean achievement in

mathematics for Kerala, and in language for Assam and Haryana.

In addition to the above three factors, the factor of teacher frequently giving arithmetic problems to solve in the class is enhancing the school mean achievement in mathematics for the states of Assam, Haryana, Kerala and Madhya Pradesh. The factor, teacher asking pupils to read aloud and take dictation in class, improves the mean achievement in language for Karnataka and Tamil Nadu.

The factor, teacher commitment has increased the pupil's achievement in mathematics for Maharashtra, and in language for Haryana, Madhya Pradesh and Maharashtra.

The remaining two factors of school academic climate, viz., parents involvement and head teacher as leader have also shown positive association with school mean achievement in some of the states.

### Gender Achievement Gap and School Effects

The effects of school-level factors on reducing the achievement gap between boys and girls have been explored. Under teacher quality, the factor of teacher qualification has reduced the gap in language for the state of Tamil Nadu. Another factor, duration of stay of a teacher in the school, is reducing the gender achievement gap in language for Karnataka.

Of the school resources factors, access to teaching material is found to be reducing the gender achievement gap in mathematics for Assam. The factor, percentage of female teachers in school is reducing the gender achievement gap in mathematics for Madhya Pradesh, and in language for the states of Madhya Pradesh, Orissa

and Tamil Nadu. The extended primary schools are reducing the gender achievement gap in mathematics for Orissa and in language for Haryana as compared to the independent primary schools.

Under the school academic climate factors, teacher assigning and correcting homework is reducing the gender gap in mathematics for Madhya Pradesh, and in language for Assam. Teacher commitment (Tamil Nadu), and parents involvement (Assam) are reducing the achievement gap in mathematics. The factor, head teacher as leader, also reduces the gap in language for Haryana.

### SC/ST Achievement Gap and School Effects

The achievement gap between SC/ST and non-SC/ST students is mostly within schools. It does not vary across schools for mathematics in any state whereas it has a discernible variation in language for Karnataka and Kerala.

Out of the three constructs, the school academic climate has explained maximum variance in SC/ST achievement gap across schools. Among the teacher quality factors, teaching experience is widening the SC/ST gap in Karnataka.

Among the factors of school academic climate, teacher frequently taking test and providing feedback has a strong positive impact in reducing the achievement gap in Kerala while parents involvement is found to be reducing the gap in Karnataka.

### Impact of State Interventions on Achievement

The contribution of Operation Blackboard (OB) and incentive (mid-day meals, free uniform, free textbooks, attendance scholarship and other scholarship) schemes to achievement has

been estimated independently.

It is found that the schools under OB scheme have performed distinctly better than non-OB schools in mathematics for Kerala and Madhya Pradesh, and in language for Assam and Madhya Pradesh. On synthesis, the results are found to be consistent in both mathematics and language across states. The OB material is found to be effective in increasing the school mean achievement in mathematics for the states of Karnataka and Madhya Pradesh, and in language for Haryana and Madhya Pradesh.

The OB scheme has also contributed to reducing the difference between boys and girls achievement in language only for the state of Madhya Pradesh.

Among the incentive schemes, the mid-day meals has shown its impact on language achievement only in Madhya Pradesh. Supply of free textbooks to students has enhanced the achievement of pupils in both the subjects for the state of Madhya Pradesh. The scholarship for regular attendance has shown a positive impact on mathematics achievement for Kerala, and on language achievement for the states of Assam and Kerala.

Amongst incentive schemes, the mid-day meals scheme has reduced the gender achievement gap in both mathematics and language for the state of Madhya Pradesh. Free supply of textbooks to students has reduced the gap in mathematics only for the state of Orissa. Other scholarships have also helped in reducing the gender achievement gap in language for Madhya Pradesh.

**Outcomes of the Study**

The important factors (Table 6.1) which may be considered for developing intervention programmes to improve the pupil's achievement are viewed in an integrated manner. Also, the improvement of achievement is looked by increasing the pupil's achievement, by reducing the gender gap, and by reducing the SC/ST gap. They are discussed in order of priority of effectiveness.

Teacher assigning and correcting homework, has emerged out to be the most effective factor. It has helped in improving the performance of pupils, and also in bridging the gender achievement gap in mathematics and language.

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Insert Table 6.1 here about
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The second most effective two factors are teacher giving arithmetic problems to solve in class, and teacher asking to read aloud and take dictation in class. The former enhances the achievement of pupils in mathematics whereas the latter in language.

The physical facility, educational facility, OB scheme, and OB material occupy the next place and each of them increases the achievement of pupils in both mathematics and language. OB scheme also reduces the gender achievement gap in language.

The frequency of teacher taking test and providing feedback to students has contributed to the school mean achievement in mathematics and language.

Teacher commitment is another factor which has shown its effectiveness in increasing pupils achievement in mathematics as well as in language. It also reduces the gender achievement gap in mathematics.

Percentage of female teachers in school has emerged out as most effective factor responsible for reducing the gender achievement gap in mathematics and language.

The factor, teacher staying for longer duration in the present school enhances the achievement in both the subjects and reduces the gender gap in language.

Parents involvement enhances the achievement in both the subjects and reduces the gender gap in mathematics and SC/ST gap in language.

The amount of time devoted to homework by the pupils has increased the achievement in both the subjects.

Head teacher as leader is helping in improving the achievement in mathematics and reducing the gender gap in language.

Among the incentive schemes, Mid-day meals enhances the achievement in language and reduces the gender gap in both mathematics and language. Free textbooks enhances the achievement in both the subjects and reduces the gender gap in mathematics. Attendance scholarships is increasing the achievement in both the subjects. Other scholarships has helped in reducing the gender achievement gap in language.

## Implications

The school academic climate factors are found to be most prominent ones followed by school resources and teacher quality. Implications of the findings are discussed in that fashion.

### School Academic Climate

All the school academic climate factors have been found meaningful in enhancing the pupils performance and bridging the gender and SC/ST gaps. The practice of assessment and feedback as a part of teaching-learning process is found to be the most effective in improving the student's performance. It is covered by the factors, like, test and feedback, assigning and correcting homework, giving arithmetic problems to solve in the class, and asking to read aloud and taking dictation. Suitable mechanism to include these factors as a part of teaching learning process needs to developed.

Further, teacher commitment and morale needs to be improved by adopting the suitable interventions.

Community participation is another aspect which needs attention.

The role of the head teacher as academic supervisor needs to be improved by providing training in the latest supervisory practices so that he/she is effective as an instructional leader.

### School Resources

The school resources and teacher quality are considered as a part of the essential schooling facilities. The factors of physical and educational facilities have sufficiently indicated their effect on learning achievement. It has been further supplemented by the impact of the OB scheme as well as by the OB

material. Therefore, it is imperative to equip schools with the essential physical and educational facilities.

Another important aspect came to lime light is the percentage of female teachers in school. Appointment of female teachers in school helps in reducing the achievement gap between boys and girls. Therefore, appointment of female teachers needs to be preferred specially in those schools which do not have any female teacher.

The factor which needs consideration is the large pupil-teacher ratio which has been the cause for the low achievement. This number may be kept as optimum so that the teaching and learning remained conducive.

### Teacher Quality

Teacher being the centre of all the schooling activities, the teachers conditions need to be re-looked because none of the factors relating to it has shown sufficient evidence for improving the achievement. In fact the longer teaching experience is the cause for lowering the achievement. Therefore, teachers' working condition, their motivation, etc. calls for improvement.

Inservice training programmes need to be redesigned suitably to make teacher more effective in actual classroom situation.

### Incentive Schemes

Among the incentive schemes, mid-day meals, free textbooks attendance scholarship have been found to be improving the achievement. These schemes may be further strengthened to help the disadvantaged students in improving their achievement.

## Limitations of the Study

The re-analysis of data of the study "Learning Achievement of Primary School Children in Reading and Mathematics" has provided the effects of students background variables on achievement which are quite tangible. It could have been still better if prior learning achievement was also included.

However, the estimates at school level were comparatively less powerful. This might be due to the fact that the study was not designed for this purpose. Actually, the study was designed with several purposes in mind.

The indicators depicting an effect are generally aggregated from the teacher level to school level. For example, qualification of teacher may provide a better estimate of its contribution if qualification of only that teacher, who is teaching the sampled students, would have been considered for definition of the indicator.

The insufficient sample is reflected while studying the effect of the incentive schemes as in most states the majority of schools receive some sort of incentive schemes. Thus this is not a sufficient sample of "non-scheme" schools to yield an accurate estimate of the effects of incentive schemes.

Besides the above mentioned limitation of the design of the study, some important aspects, like, the teaching quality, teacher's motivation and their attitude, etc., could not be included in the study.

## Suggestions for Future Studies

There is a vast scope for undertaking research in order to study the different aspects of schooling system with the help of the powerful statistical technique - multi-level linear regression model. However, the efficient use of this technique demands a properly planned and scientifically designed study executed in a systematic manner to provide the indicators of high precision. The design of the study should be based on a representative sample, covering the whole range of target institutions/ groups which could provide the reasonably powerful estimates of effects. Keeping these aspects in view the following studies may be undertaken.

(i) The findings of the present study need to be supplemented and complemented by undertaking micro-level field/ case studies.

(ii) The study to be undertaken at the second phase of DPEP needs to have the same ingredients as those of the present study to provide the estimates of changes over a period of time.

(iii) Effect of pedagogical factors of teaching on learning achievement at different grade levels.

(iv) Longitudinal studies on school effectiveness and learning achievement.

Table 6.1
School-level Factors Contributing to Pupil's Achievement, Reducing Gender and SC/ST Gap in Mathematics and Language in Different States

| Factor | Achievement | | Gender Gap | | SC/ST Gap |
|---|---|---|---|---|---|
| | Math | Lang | Math | Lang | Lang |
| Teacher Quality | | | | | |
| Tch Qual | ASM | ASM, TN | - | TN | - |
| Tch Exp | - | - | - | - | - |
| Inservice | - | - | - | - | - |
| Stay period | MP | TN | - | KAR | - |
| School Resources | | | | | |
| Material | - | - | ASM | - | - |
| Ednl Facil | KER, MP | MP | - | - | - |
| Phy Facil | KAR, MP, ORI | KAR, MP, ORI | - | - | - |
| No. of Tchrs | - | TN | - | - | - |
| P-T Ratio | - | - | - | - | - |
| Primary | - | - | - | - | - |
| Pct FmTch | - | - | MP | MP, ORI, TN | - |
| School Academic Climate | | | | | |
| Math problem | ASM, HAR, KER, MP | - | - | - | - |
| Read & dictn | - | KAR, TN | - | - | - |
| Test feedback | KAR, KER, MP | KER, MP | - | - | KER |
| Tch give HW | MAH, ORI, TN | ASM, MP, MAH | MP | ASM | - |
| Ppl do HW | KER | ASM, HAR | - | - | - |
| Tch commit | MAH | HAR, MP, MAH | TN | - | - |
| Prnt invl | KAR | KER | ASM | - | KAR |
| Ht leader | ASM | - | - | HAR | - |
| State Interventions | | | | | |
| OB scheme | KER, MP | ASM, MP | - | MP | - |
| OB material | KAR, MP | HAR, MP | - | - | - |
| Mid-day meals | - | MP | MP | MP | - |
| Free uniform | - | - | - | - | - |
| Free textbooks | MP | MP | ORI | - | - |
| Attnd scholarship | KER | KER | - | - | - |
| Other scholarship | - | - | - | MP | - |

# CHAPTER 7

# METHODOLOGY

## Sampling Design of the Study

The present study followed the multi-stage stratified random sampling procedure in selection of schools, teachers and students. To begin with, under the District Primary Education Programme, 44 districts were selected from the eight states, namely, Assam, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu The selection criterion was the female literacy rate. Those districts where female literacy rates were below the national average (39 per cent as per 1991 Indian Census) formed this group. Further, about 20 per cent of rural blocks and urban areas were randomly selected from the districts. Wherever, a tribal block did not appear in the selected list, one tribal block was added to the sample. From these selected blocks and urban areas, 35-45 primary schools were randomly selected for each district. The representation of rural and urban was made on the basis of proportionate allocation considering the rural and urban population.

Further, the students of class IV or V, depending upon the terminal stage of primary schooling in different states, were selected. The students of class V were selected in the states of Haryana, Madhya Pradesh, Orissa and Tamil Nadu , whereas students of class IV were selected in Assam, Kerala, Karnataka, and Maharashtra. When the number of class IV/V students in a school

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This chapter was written by Satvir Singh.

was less than or equal to 30, all students were selected. In case this number exceeded 30, only 30 students were randomly selected. While selecting the teachers the criterion adopted was: all teachers, when their number including the head teacher was less than or equal to 5, and only 5 teachers were randomly selected when this number exceeded 5. Following this procedure, the data relating to 1,746 schools, 23,700 students and 4,879 teachers were finally included in the analysis. The state-wise details are given in Table 7.1.

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Insert Table 7.1 here about

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## Construction of Indicators

Construction of indicators was taken up keeping in view the conceptual framework presented in Chapter 1. First of all, the two criterion variables, viz., the student's achievement scores in mathematics and language were standardised with mean zero and standard deviation one. The intention was to make them comparable as the tests of different lengths were administered to class IV/V students. Also, the standard scores facilitate the interpretation of HLM results.

For constructing other indicators all the items of information given in Student (Present) Schedule(SS), School Record Schedule(SRS), and Teacher Schedule(TS) were thoroughly examined in respect of their relevance. The items identified were further scrutinised from the point of view of quality and type of response(yes/no, multiple choice, etc.) and coding system adopted

while transferring the data on magnetic media. These data were recoded wherever it was considered necessary. The data were scrutinised for quality following standard procedure for detection of impossible responses by applying range checks, consistency checks within and between schedules. The cleaned data sets were further examined by exploring the behavior of each selected item in terms of their frequency distribution, measures of central tendency and spread, correlations with other variables and ordinary linear regression estimates with the criterion variables. The analysis of these statistics helped in developing the indicators with minimum multi-colinearity among them. All the indicators, so developed, are presented in Table 7.2 along with the description of their construction procedure followed in their construction. This table also gives the final form (standardised or centered) of indicators used in the HLM analysis. Those indicators, which are not standardised, are centered by subtracting their respective means.

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Insert Table 7.2 here about
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In all thirty five indicators are developed. Of which seven are at the pupil-level and twenty eight at the school-level. Among school-level indicators, two indicators, viz, mean-SES and per cent SC/ST, are specifically included as the school intake composition generally termed as "school context". The mean-SES is obtained for each school by aggregating the socio-economic status(SES) of each student. It may be mentioned that the indicator SES is obtained as a composite of three pupil-level variables, viz., father's education, mother's

education, and father's occupation. The other school context indicator, i.e., per cent SC/ST is constructed as percentage of SC and ST students in the sample of a school.

The statewise basic statistics, viz., mean and standard deviation for each indicator are given in Table 7.3. These statistics not only depict the characteristics of the variable but also indicate, in some cases, the sample characteristics. They will further provide insight at the time of discussion of the results.

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Insert Table 7.3 here about

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**Procedure of Data Analysis**

A multilevel regression analysis fits a hierarchical linear model(HLM) to data that are organised hierarchically (Bryk & Raudenbush, 1992). In this study students are nested within schools. The HLM procedure help to partition the variation in a variable into within and between schools, and to examine the relationships among variables both within and among schools. The first step of HLM analysis is called a "null model". The null model, which does not include any student background co-variate, provides the variation within and between schools. For the purpose, the standardised scores in mathematics and language are independently included in the model. In the next step, the pupil's background variables are included to explain the within as well between school variation. The student background variables which did not indicate significant variation across

schools for a state have been constrained for that state. The difference between within school variance before and after adjusting for pupil's background variables provides the variance explained by the pupil's background variables. This analysis also provides the adjusted school means.

The mean SES and per cent SC/ST of the school are considered important variables as the intake composition of a school, which can have a "contextual effect" on student achievement over and above the individual characteristics. These two variables have been included in the analysis for further adjustment of the school means.

The factors related to three different school level constructs, viz., teacher quality, school resources, and school academic climate are included enblock in the HLM analysis independently after adjusting for the effects of pupil's background and contextual variables. This approach has been adopted for all the eight states.

In order to study the achievement gap between boys and girls, and between SC/ST and non-SC/ST students, these gaps were modeled by the factors of teacher quality, school resources and school climate.

The impact of state interventions, viz, OB scheme and incentive schemes on achievement is analysed independently. The effects of OB scheme only, and OB scheme along with OB material are obtained separately with the help of HLM. The intervention variables are also included in modeling the achievement gap in boys and girls. The SC/ST gap is specifically modeled by the indicators of incentive schemes as these schemes are for the

weaker section of the society. Some of the important aspects are examined with the help of appropriate graphical plots.

In order to have synthesis of the state results the regression coefficients and their standard errors with probability level less than 0.20 for each variable was taken for applying meta analysis using variance known method.

## Table 7.1
## State-wise Sample of Districts, Schools, Teachers and Students

| State | Districts | Schools | Teachers | Pupils |
|---|---|---|---|---|
| ASM | 04 | 161 | 439 | 1706 |
| HAR | 04 | 144 | 531 | 2489 |
| KAR | 04 | 176 | 437 | 2568 |
| KER | 03 | 113 | 502 | 3089 |
| MP | 18 | 733 | 1701 | 8010 |
| MAH | 03 | 135 | 409 | 2143 |
| ORI | 04 | 165 | 515 | 1364 |
| TN | 03 | 119 | 345 | 2323 |
| Total | 43* | 1746 | 4879 | 23700 |

(* Data of one district in Madhya Pradesh were excluded due to non-availability of achievement scores on language.

## Table 7.2
## Indicators at Pupil and School Levels

| Sl. No. | Label (Schedule & Q.No.) | Indicator description | Procedure adopted in Construction of Indicator |
|---|---|---|---|
| **I Pupil's Background Variable** | | | |
| 1. | GIRL<br>(SS 3) | Gender | GIRL=1, Boy=0<br>Centred at pupil level |
| 2. | SCST<br>(SS 6) | Caste | SC or ST=1, Non-SCST=0<br>Centred at pupil level |
| 3. | DADED<br>(SS 9) | Father education | Illiterate=1, literate=2, Primary=3, Secondary=4,Hr./Sr. Sec.=5, College=6<br>Logit transformation<br>Standardised |
| 4. | MUMED<br>(SS 9) | Mother education | Illiterate=1, literate=2, Primary=3, Secondary=4,Hr./Sr. Sec.=5, College=6<br>Logit transformation<br>Standardised |
| 5. | DADOCC<br>(SS 10) | Father occupation | Unskilled worker=1; Poultry farming=2; Picking forest produce=3; Agri.labourer=4; Farmer=5; Skilled worker=6; Street vendor=7; Others=8; Self employed=9; Domestic servant=10; Household=11; Clerk=12; Employer=13; Senior officer=14<br>Logit transformation & Standardised |
| 6. | REPEAT<br>(SS H14) | Ever repeated a class | REPEAT= 1 if yes in any class, Else=0<br>Centred at pupil level |
| 7. | SES | Socio-economic status | SES=(DADED+MMUMED+DADOCC)/Valid responses<br>Composite & standardised |
| **II Contextual Variables** | | | |
| 1. | MEANSES | School Mean SES | Aggregated from pupil to school level<br>Centred at school level |
| 2. | PCTSCST | Per cent SCST | Per cent of SC and ST in the school<br>Centred at school level |
| **III Teacher's Quality Variables** | | | |
| 1. | TCHQUA<br>(TS 4) | Qualification | Class VIII=8, class X=10, class XI/XII=12, graduate=14, post graduate =16)<br>Aggregated & centered at school level |

| Sl. No. | Label (Schedule & Q.No.) | Indicator description | Procedure adopted in Construction of Indicator |
|---|---|---|---|
| 2. | TCHEXP (TS 10B) | Experience | 1993- year of first appointment<br>Aggregated & centered at school level |
| 3. | INSERVIC (TS 13) | Inservice training | INSERVIC=1,if received during last 3 years<br>Aggregated & centered at school level |
| 4. | STABLE (TS 10C) | Period in present school | Subtracted year of appointment from 1993<br>Aggregated & centered at school level |
| **IV** | **Resource Variables** | | |
| 1. | MATERIAL (TS 20A 21A1-A9) | Access to teaching material | Add all "yes =1" against 10 items: (1. Blackboard 2. Teacher's Guides 3. Dictionary 4. Books 5. Map 6. Glob 7. Charts 8. Flash Cards 9. Science Kit 10. Mathematics Kit)<br>Aggregated & centered at school level |
| 2. | FACILED (SRS 22 (1-9,15,16)) | Instructional material available | Add all "yes =1" for 13 items: (1.Maps 2.Globe 3.Charts 4.Play material & Toys 5.Games equipment 6. Science kit 7. Mini Tool Kit 8. Mathematics Kit 9.Books for Library - Reference, Dictionaries, Encyclopedia 10. Books for Library - Children's Books 11. Books for Library - Magazines, Journals, Newspapers 12. Blackboard 13. Pin-up board/Notice Board)<br>Aggregated & centered at school level |
| 3. | FACILPH (SRS 22(10, 12-14,18-27)) | Physical facility | Add all "yes =1" for 14 items: (1. School Bell 2. Mats & Furniture for students 3. Chairs for teachers 4.Tables for teacher 5. Water pitcher, ladle glasses 6. Dust-bin 7. Safe drinking water 8. Toilet facilities 9. Separate toilet for girls 10. Electric Connection 11. Playground facilities 12. Annual medical checkup for children 13. Immunization facility 14. First aid kit)<br>Aggregated & centered at school level |
| 4. | NUMTCH (SRS 9) | No. of teachers | Total of male & female teachers for 1993-94<br>Centered at school level |

| Sl. No. | Label (Schedule & Q.No.) | Indicator description | Procedure adopted in Construction of Indicator |
|---|---|---|---|
| 5. | PTRATIO<br>(SRS 6C) | Pupil teacher Ratio | Total enrolment of ~~classes~~ I-V/ NUMTCH<br>Centered at school level |
| 6. | PRIMARY<br>(SRS 3) | Primary and Extended Primary | PRIMARY=1 for classes I-IV/V, Else=0<br>Centered at school level |
| 7. | PCTFEMT<br>(SRS 9) | Percent female teachers | Female teachers*100/NUMTCH<br>Centered at school level |
| **V** | **Climate of School** | | |
| 1. | PRESSLNG<br>(SS 30,32) | Academic press in language | Teacher ask to read & give dictation in class: Never =0, Sometimes =1, Everyday =2, Average by valid responses,<br>Aggregated and centered at school level |
| 2. | PRESSMTH<br>(SS 33) | Academic press in Math. | Teacher give arith. problem to solve in class: Never =0, Sometimes =1, Everyday =2,<br>Aggregated & centered at school level |
| 3. | PRESSTST<br>(SS 34) | Academic press test & feedback | Teacher give test and feedback to students; For test: never=1, once a while=2, once in a year=3, once in a term=4, once in a month=5, once in a week=6.<br>For feedback- not applicable=1, never=2, sometimes=3, always=4.<br>Average by valid response after using Logit<br>Aggregated & centered at school level |
| 4. | PRESSTHW<br>(SS 35A,C) | Academic press teacher give home work | Teacher assign and correct home work<br>Never=0, Sometimes=1, Always/regularly=2<br>Average by valid responses,<br>Aggregated & centered at school level |
| 5. | PRESSPHW<br>(SS 35B) | Academic press Pupil doing Homework | No & do not do home work=0,less than 30 minutes=1, 30-60 minutes.=2, 61-120 minutes=3, over 120 minutes=4.<br>Aggregated & centered at school level |
| 6. | COMMIT<br>(SS 29A,36) | Teacher commitment | Teacher comes to class-Rarely=1, Sometimes=2, Most of the days =3, Everyday=4;<br>Teacher provide special help- Never=1, sometime=2, Always=4<br>Average by valid responses after Logit.<br>Aggregated & centered at school level |

| Sl. No. | Label (Schedule & Q.No.) | Indicator description | Procedure adopted in Construction of Indicator |
|---|---|---|---|
| 7. | PRNTINV (TS 30C,D) | Parent involvement | Parent-teacher meeting,& meeting parents, Never=0, Once in year=1,Once in term=2, Once in a month=3,Once in a week=4<br>Average by valid responses,<br>Aggregated & centered at school level |
| 8. | HMLEADER (TS 30A,B) | Head teacher as leader | Reviewing the performance of his/her class and all classes-Never=0, Once in year=1, Once in a term=2, Once in a month=3, Once in a week=4<br>Average by valid responses,<br>Aggregated & centered at school level |

**VI Intervention Variables**

| Sl. No. | Label (Schedule & Q.No.) | Indicator description | Procedure adopted in Construction of Indicator |
|---|---|---|---|
| 1. | OPBLACK (SRS 21) | Operation Black-board Scheme | Recode OPBLACK=1, Else=0<br>Centered at school level |
| 2. | FACILOP (SRS 22(1-15, 17-20) | Material as per OB Scheme | Add all yes= 1 for 22 items: (1. Maps 2. Globe 3. Charts 4. Play material & Toys 5. Games equipment 6. Primary Science kit 7. Mini Tool Kit 8. Mathematics Kit 9. Books for Library - Reference, Dictionaries, Encyclopedia 10. Books for Library - Children's Books 11. Books for Library - Magazines, Journals, Newspapers 12. School Bell 13. Musical Instruments 14. Mats & Furniture for students 15. Chairs for teachers 16. Tables for teacher 17. Blackboard 18. Chalk and duster 19. Water pitcher, ladle glasses 20. Dust-bin 21. Safe drinking water 22. Toilet facilities)<br>Centered at school level |
| 3. | MDMEAL (SRS 31) | Mid-day Meals | Percentage of beneficiaries =((male+female)/enrolment in primary classes))*100<br>Centered at school level |
| 4. | UNIFORM (SRS 31) | Free Uniform | Percentage of beneficiaries =((male+female)/enrolment in primary classes))*100<br>Centered at school level |

| Sl. No. | Label (Schedule & Q.No.) | Indicator description | Procedure adopted in Construction of Indicator |
|---|---|---|---|
| 5. | TEXTBOOK (SRS 31) | Free Textbooks | Percentage of beneficiaries =((male+female)/enrolment in primary classes))*100<br>Centered at school level |
| 6. | SRATTEND (SRS 31) | Scholarship for Regular Attendance | Percentage of beneficiaries =((male+female)/enrolment in primary classes))*100<br>Centered at school level |
| 7. | OSCHOLAR (SRS 31) | Other Scholarship | Percentage of beneficiaries =((male+female)/enrolment in primary classes))*100<br>Centered at school level |

## Table 7.3
## State-wise Mean and S.D.s

| Variable | ASM | | HAR | | KAR | | KER | |
|---|---|---|---|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D | Mean | S.D. | Mean | S.D. |
| Student Level Variables | | | | | | | | |
| MATH | 19.87 | 7.35 | 15.20 | 5.40 | 15.58 | 7.82 | 14.89 | 5.67 |
| LANG | 21.23 | 7.09 | 37.10 | 1.48 | 16.34 | 7.23 | 20.68 | 8.11 |
| GIRL | .48 | .50 | .49 | .50 | .40 | .49 | .48 | .50 |
| SCST | .24 | .43 | .24 | .43 | .23 | .42 | .11 | .32 |
| DADED | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 | 00 | 1.00 |
| MUMED | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 |
| DADOCC | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 |
| REPEAT | .37 | .48 | .33 | .47 | .23 | .42 | .21 | .41 |
| SES | .00 | .79 | .00 | .73 | .00 | .75 | .00 | .67 |
| School Level Variables | | | | | | | | |
| MEANSES | -.17 | .54 | -.03 | .49 | -.14 | .55 | .00 | .36 |
| PCTSCST | 33.19 | 42.00 | 25.55 | 24.52 | 25.30 | 25.74 | 11.41 | 14.44 |
| TCHQUAL | 9.95 | 1.23 | 10.73 | .92 | 11.37 | 1.40 | 11.47 | .80 |
| TCHEXP | 15.18 | 7.50 | 16.69 | 7.49 | 12.31 | 8.42 | 13.97 | 4.91 |
| INSERVIC | .31 | .33 | .64 | .36 | .55 | .39 | .68 | .27 |
| STABLE | 7.60 | 5.53 | 3.87 | 3.07 | 4.82 | 4.04 | 8.03 | 5.29 |
| MATERIAL | 3.41 | 2.47 | 5.97 | 2.07 | 6.70 | 2.12 | 5.93 | 1.99 |
| FACILED | 4.35 | 3.20 | 8.68 | 3.08 | 8.92 | 3.56 | 5.80 | 3.17 |
| FACILPH | 3.57 | 1.88 | 8.52 | 2.47 | 5.51 | 2.59 | 6.95 | 3.03 |
| NUMTCH | 2.99 | 1.73 | 3.65 | 2.25 | 4.85 | 2.21 | 9.72 | 6.47 |
| PTRATIO | 38.79 | 19.52 | 64.85 | 39.95 | 23.89 | 18.94 | 5.48 | 1.86 |
| PRIMARY | .96 | .21 | .83 | .37 | .57 | .50 | .59 | .49 |
| PCTFEMT | 25.40 | 30.46 | 50.10 | 39.96 | 53.25 | 18.59 | 54.68 | 20.72 |
| PRESSLNG | 1.15 | .29 | 1.48 | .44 | 1.37 | .40 | 1.18 | .18 |
| PRESSMTH | 1.70 | .34 | 1.84 | .36 | 1.54 | .41 | 1.63 | .27 |
| PRESSTST | -.06 | .85 | -.08 | .77 | -.07 | 67 | .02 | .57 |
| PRESSTHW | 1.25 | .35 | 1.82 | .25 | 1.50 | .41 | 1.43 | .24 |
| PRESSPHW | 3.11 | 1.30 | 3.46 | 1.08 | 2.09 | .82 | 1.77 | .44 |
| COMMIT | .02 | .63 | -.05 | .69 | -.05 | .67 | .003 | .46 |
| PRNTINV | 2.01 | .69 | 2.17 | .77 | 2.07 | .96 | 1.99 | .47 |
| HMLEADER | 2.28 | .47 | 2.68 | .96 | 2.62 | .89 | 2.49 | .35 |
| OPBLACK | .46 | .50 | 0.76 | .43 | .50 | .50 | .48 | .50 |
| FACILOP | 7.21 | 4.28 | 14.51 | 3.91 | 11.80 | 4.67 | 10.50 | 4.38 |
| MDMEAL | .00 | .00 | .00 | .00 | 11.71 | 27.49 | 75.56 | 35.72 |
| UNIFORM | 4.27 | 17.90 | 11.59 | 12.97 | 20.98 | 23.50 | .24 | 1.71 |
| TXTBOOK | 95.12 | 17.46 | 18.34 | 19.20 | 15.72 | 21.68 | 21.89 | 13.73 |
| SRATTEND | .20 | 1.80 | 13.54 | 17.06 | 6.41 | 16.45 | 5.44 | 11.61 |
| OSCHOLAR | .05 | .47 | 9.84 | 18.55 | 1.69 | 6.25 | 9.48 | 14.97 |

contd..

## Table 7.3 (contd.)
## State-wise Mean and S.D.s

| Variable | MP | | MAH | | ORI | | TN | |
|---|---|---|---|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Student Level Variables | | | | | | | | |
| MATH | 11.23 | 5.31 | 11.67 | 6.49 | 14.61 | 6.61 | 11.27 | 4.65 |
| LANG | 28.68 | 14.69 | 16.60 | 8.38 | 34.85 | 12.91 | 30.53 | 10.88 |
| GIRL | .43 | .50 | .44 | .50 | .37 | .48 | .46 | .50 |
| SCST | .26 | .44 | .35 | .48 | .38 | .49 | .27 | .44 |
| DADED | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 |
| MUMED | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 |
| DADOCC | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 | .00 | 1.00 |
| REPEAT | .31 | .46 | .31 | .46 | .31 | .46 | .31 | .46 |
| SES | .00 | .74 | .00 | .74 | .00 | .77 | .00 | .71 |
| School Level Variables | | | | | | | | |
| MEANSES | -.18 | .53 | -.16 | .53 | -.23 | .66 | -.04 | .39 |
| PCTSCST | 30.68 | 29.93 | 37.53 | 32.05 | 48.23 | 37.15 | 26.77 | 30.03 |
| TCHQUAL | 12.55 | 1.60 | 11.07 | 1.26 | 11.68 | 1.40 | 11.73 | 1.23 |
| TCHEXP | 16.24 | 8.46 | 15.84 | 8.44 | 14.39 | 6.50 | 20.47 | 7.15 |
| INSERVIC | .52 | .40 | .64 | .36 | .43 | .31 | .72 | .31 |
| STABLE | 7.51 | 5.10 | 5.29 | 4.68 | 4.67 | 3.28 | 7.59 | 5.34 |
| MATERIAL | 4.73 | 3.07 | 6.54 | 2.05 | 8.15 | 1.76 | 7.93 | 1.93 |
| FACILED | 6.55 | 4.47 | 7.87 | 3.28 | 10.22 | 3.35 | 10.65 | 3.81 |
| FACILPH | 5.15 | 2.94 | 5.48 | 2.59 | 5.72 | 2.59 | 7.22 | 2.94 |
| NUMTCH | 2.82 | 2.03 | 2.71 | 2.25 | 3.81 | 2.19 | 3.34 | 2.49 |
| PTRATIO | 50.51 | 29.31 | 42.05 | 17.78 | 29.52 | 13.11 | 61.15 | 32.32 |
| PRIMARY | .96 | .19 | .67 | .00 | .80 | .40 | .86 | .35 |
| PCTFEMT | 16.25 | 28.64 | 13.26 | 25.48 | 20.65 | 26.69 | 28.31 | 32.86 |
| PRESSLNG | 1.27 | .42 | 1.30 | .30 | 1.21 | .35 | 1.36 | .26 |
| PRESSMTH | 1.37 | .48 | 1.41 | .35 | 1.33 | .37 | 1.41 | .33 |
| PRESSTST | -.14 | .76 | -.07 | .80 | -.11 | .61 | -.08 | .52 |
| PRESSTHW | 1.36 | .48 | 1.40 | .33 | 1.30 | .44 | 1.57 | .33 |
| PRESSPHW | 2.89 | 1.29 | 2.60 | .96 | 3.04 | 1.40 | 1.67 | .77 |
| COMMIT | -.04 | .65 | -.01 | .52 | -.11 | .73 | -.07 | .42 |
| PRNTINV | 2.09 | 1.03 | 2.52 | .64 | 2.17 | .93 | 2.56 | .63 |
| HMLEADER | 1.77 | 1.03 | 2.65 | .62 | 2.29 | .56 | 2.01 | .92 |
| OPBLACK | .55 | .50 | .81 | .39 | .82 | .38 | .80 | .40 |
| FACILOP | 10.01 | 6.11 | 11.36 | 4.31 | 14.51 | 4.76 | 15.65 | 5.56 |
| MDMEAL | 7.21 | 25.51 | 2.50 | 14.93 | 1.48 | 9.02 | 77.16 | 23.29 |
| UNIFORM | 13.43 | 18.81 | 16.34 | 26.93 | 4.34 | 16.36 | 78.12 | 23.07 |
| TXTBOOK | 58.14 | 36.02 | 28.24 | 30.38 | 40.71 | 34.22 | 79.99 | 19.83 |
| SRATTEND | 9.46 | 23.48 | 5.33 | 13.24 | .03 | .31 | .74 | 8.10 |
| OSCHOLAR | 1.54 | 6.86 | .46 | 3.09 | .87 | 6.52 | 2.58 | 14.31 |

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